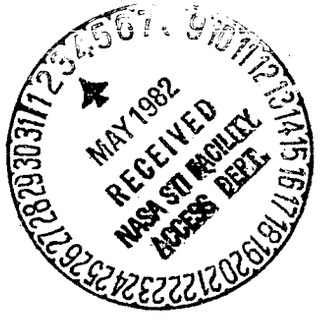
NASA TECHNICAL MEMORANDUM

NASA TM-82466

MATERIALS PROCESSING IN SPACE BIBLIOGRAPHY

Compiled by Elizabeth Pentecost
Space Sciences Laboratory



March 15, 1982

NASA

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama

MSFC - Form 3190 (Rev June 1971)

TECHNICAL REPORT STANDARD TITLE PAGE

1. REPORT NO.	2. GOVERNMENT ACCESSION NO.	3. RECIPIENT'S CATALOG NO.
NASA TM-82466		

4. TITLE AND SUBTITLE	5. REPORT DATE
Materials Processing in Space Bibliography	March 15, 1982
	6. PERFORMING ORGANIZATION CODE

7. AUTHOR(S)	8. PERFORMING ORGANIZATION REPORT #
Compiled by Elizabeth Pentecost*	

9. PERFORMING ORGANIZATION NAME AND ADDRESS	10. WORK UNIT NO.
George C. Marshall Space Flight Center Marshall Space Flight Center, Alabama 35812	11. CONTRACT OR GRANT NO.
	13. TYPE OF REPORT & PERIOD COVERED
12. SPONSORING AGENCY NAME AND ADDRESS	Technical Memorandum
National Aeronautics and Space Administration Washington, D.C. 20546	14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

*Universities Space Research Association

Prepared by Space Sciences Laboratory, Science and Engineering Directorate, NASA/MSFC

16. ABSTRACT

This report is a bibliographic listing of current literature dealing with flight experiments utilizing a low-gravity environment to elucidate and control various processes or with ground-based activities that provide supporting research. Included are Government reports, contractor reports, conference proceedings, and journal articles. Subdivisions of the bibliography include the five categories: Crystal Growth; Metals, Alloys, and Composites, Fluids and Transport; Glasses and Ceramics; and Ultrahigh Vacuum and Containerless Processing Technologies, in addition to a list of patents and appendices providing a compilation of anonymously authored collections and reports and a cross reference index.

17. KEY WORDS	18. DISTRIBUTION STATEMENT
	G. K. Tingle Unclassified — Unlimited

19. SECURITY CLASSIF. (of this report)	20. SECURITY CLASSIF. (of this page)	21. NO. OF PAGES	22. PRICE
Unclassified	Unclassified	188	NTIS

MSFC - Form 3292 (Rev. December 1972)

For sale by National Technical Information Service, Springfield, Virginia 22151

PREFACE

The Materials Processing in Space (MPS) Bibliography is a comprehensive compilation of Government reports, contractor reports, conference proceedings, and journal articles dealing with flight experiments utilizing a low-gravity environment to elucidate and control various processes or with ground-based activities that provide supporting research. The bibliography is subdivided into various categories, including: Crystal Growth; Metals, Alloys, and Composites; Fluids and Transport; Glasses and Ceramics; and Ultra-high Vacuum and Containerless Processing Technologies. The category in some cases has been chosen rather arbitrarily, recognizing that in almost all cases only the processes that occur in the fluid phase are subjected to the influence of gravity. Generally the choice was based on the emphasis of the experiment. Experiments that are primarily concerned with the growth of single crystals are classified under Crystal Growth. Those that actually involve solidification of metals, metal models, and various composites were catalogued under Metals, Alloys and Composites. Those that primarily measure effects in fluids, heat flow and separation and chemical processes were catalogued under Fluids, Transports and Chemical Processes. Some papers that deal with observed effects of low gravity on living organisms that may pertain to materials processing are also included. Papers that pertain primarily to equipment and facilities for carrying out flight experimentation are placed in a separate category, as are those that summarize flight programs or give a general survey of materials processing in space. European, Soviet, and Japanese documents that deal with their respective flight programs are listed according to the specific categories discussed previously. Section II is a list of all patents produced by scientists involved in the MPS program during the last eight years. Appendix A is a compilation of papers, symposium proceedings, industry reports, committee reports, etc., which are not authored. Appendix B is a cross reference index.

It should be emphasized that this document represents an attempt to compile the current literature generated by the flight experiments and ground-based investigations dedicated to the study of processing materials in space. An annual edition of the bibliography is planned in order to add current literature. All papers referenced are on file in the Space Processing Division at Marshall Space Flight Center. Copies can be made available to workers in the field upon request to the bibliographer.

Any omissions that might have occurred are sincerely regretted. Investigators are encouraged to submit information on any work that was inadvertently omitted or any new work to the bibliographer for inclusion in next year's edition of the bibliography. All correspondence concerning corrections, additions, or deletions to the Materials Processing in Space Bibliography should be directed

to: Ms. Elizabeth Pentecost, Bibliographer, Code ES71, NASA/MSFC, Marshall Space Flight Center, AL 35812.

Robert J. Naumann
Chief Scientist
Materials Processing in Space Program

TABLE OF CONTENTS

I. MATERIALS PROCESSING IN SPACE PROGRAM

Crystal Growth

Abernathy, J. R. and Rosenberger, F., "Soret Difusion and Convective Stability in a Closed Vertical Cylinder," Phys. Fluids 24, 377 (1981).

Ahn, K. S., Carranza, R. A., Elwell, D., and Feigelson, R. S., "Crystal Growth of Cesium Cadmium Chloride ($CsCdCl_3$)," J. Cryst. Growth 50, 775-778 (1980).

Becla, P., Lagowski, P., Gatos, H. C., and Ruda, H., "Modified Approach to Isothermal Growth of Ultrahigh Quality HgCdTe for Infrared Applications," J. Electrochem. Soc. 128, 1171-1173 (May 1981).

Bevelo, A. J., Schmidt, F. A., Shanks, H. R. and Campisi, G. J., "Polycrystalline Silicon on Tungsten Substrates," J. Vac. Sci. Techol. 16, 13-19 (January/February 1979).

Bevelo, A. J., Verhoeven, J. D., and Noack, M., "Electron Los Study of Native Oxide of Tin," J. Vac. Sci. Techn. (1980).

Boettinger, W. J., Burdette, H. E., Farabaugh, E. N., and Kuriyama, M., "Some Topographic Observations of Effects of Dynamical Diffraction in Imperfect Metal Crystals," Adv. X-Ray Analysis 20, 207-219 (1977).

Boettinger, W. J., Burdete, H. E., and Kuriyama, M., "Observations of Oblique Magnetic Domain Walls in Nickel Single Crystals by X-Ray Topography," Phil. Mag. 36, 763-776 (1977).

Boettinger, W. J., Burdette, H. E., and Kuriyama, M., "Application Contrast Conditions to Dynamical Images of Immobile Dislocations," Phil. Mag. 34, 119-127 (1976).

Boettinger, W. J., Burdette, H. E., and Kuriyama, M., "Asymmetric Crystal Topographic Camera," Rev. Sci. Instrum. 47, 906-911 (August 1976).

Bourgeois, S. V. and Spradley, L. W., "Thermocapillary Convection in Microgravity Crystal Growth Melts of Indium Antimonide," Lett. in Heat & Mass Transfer 3, 193-204 (1976).

Bourret, E. D., Favier, J. J., and Witt, A. F., "Theoretical Analysis of Directional Melting," submitted to Journal of Crystal Growth, 1981.

Brown, R. A. and Chang, C. J., "The Effect of Natural Convection on the Shape of the Melt/Solid Interface," Bull. Am. Phys. Soc. 25, 1100 (1980).

Bryskiewicz, T., Lagowski, J., et al., "Electroepitaxy of Multicomponent SystemsL Ternary and Quarternary Compounds," J. Appl. Phys. 51, 988 (1980).

Carlson, F. M., "Convection Effects During Bridgman Growth of Semiconductors," NASA/Langley, NSG-1572, April 1980, 18 pgs.

Carlson, F. M., Chin, L. Y., Fripp, A. L., and Crouch, R. K., "Finite Element Analysis of the Effect of a Non-Planar Solid-Liquid Interface on the Lateral Solute Segregation During Unidirectional Solidification," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Carruthers, J. R., "Crystal Growth in a Reduced Gravity Environment," Materials Sciences in Space with Application to Space Processing, Progress in Astronautics and Aeronautics, Vol. 52, 1977, pp. 33-40.

Carruthers, J. R., "Crystal Growth in a Low-Gravity Environment," J. Cryst. Growth 42, 379-385 (1977).

Castle, J. G., "Electrical Characterization of GaAs Single Crystal in Direct Support of M555 Flight Experiment," Final Technical Report, NAS8-29542, September 1975, 60 pgs.

Castle, J. G., "Space Processing of Crystalline Materials: A Study of Known Methods of Electrical Characterization of Semiconductors," NAS8-30774, Final Report, January 1976, 58 pgs.

Chandra, D. and Wiedemeier, H., "Chemical Vapor Transport and Crystal Growth of the $Hg_{.8}Cd_{.2}Te$ System, Effect of Inclination of the Density Gradient Respect to the Gravity Vector," accepted for publication in Zeit. f. Phys. Chem, 1981.

Chang, C. E. and Wilcox, W. R., "Heat Transfer in Vertical Zone Melting of Poor Thermal Conductors," J. Cryst. Growth 28, 288-294 (1975).

Chang, C. E. and Wilcox, W. R., "Inhomogenization Due to Thermocapillary Flow in Floating Zone Melting," J. Cryst. Growth 28, 8-12 (1975).

Chang, C. E., Wilcox, W. R., and Lefever, R. A., "Thermocapillary Convection in Floating Zone Melting: Influence of Zone Geometry and Prandtl Number at Zero Gravity," Mat. Res. Bull. 14, 527-536 (1979).

Chang, C. E., Lefever, R. A., and Wilcox, W. R., "Analytic of Crystal Growth in Space," NAS8-29847, Final Report, 66 pgs.

Chang, C. J. and Brown, R. A., "Finite Element Calculations of Buoyancy-Driven Convection Near a Melt/Solid Phase Boundary," Second National Symposium on Numerical Methods in Heat Transfer, University of Maryland, September 28-30, 1981.

Chang, C. J. and Brown, R. A., "Finite Element Calculation of Natural Convection During Steady Solidification," submitted to International Journal of Numerical Methods in Fluids, 1981.

Chang, C. J. and Brown, R. A., "Radial Segregation Induced by Natural Convection and Melt/Solid Interface Curvature in Melt Crystal Growth," submitted to Journal of Crystal Growth, 1981.

Chu, T. L., "Physical Phenomena Related to Crystal Growth in the Space Environment, Final Report, November 1972, 30 pgs.

Chu, T. L., "Physical Phenomena Related to Crystal Growth in the Space Environment," NASA CR-2281, July 1973.

Clark, I. O., Fripp, A. L., and Crouch, R. K., "Diffusion Coefficients for Liquid $Pb_{1-x}Sn_xTe$," 157th Electrochemical Society Meeting, St. Louis MO, May 1980.

Clark, I. O., Fripp, A. L., and Crouch, R. K., "Solutal Diffusion Coefficient for Liquid PbTe-SnTe," submitted to Journal of Electrochemical Society, 1981.

Clayton, J. C., "Analysis of Directional Solidification Space Processing Experiments," Annual Report, December 11, 1979-December 11, 1980, 107 pgs.

Clayton, J. C., Davidson, M. C., Gillies, D. C., and Lehoczky, S. L., "One-Dimensional Analysis of Segregation in Directionally Solidified HgCdTe," submitted for publication in Journal of Crystal Growth, 1981.

Coriell, S. R., Cordes, M. R., and Boettinger, W. J., "Convective and Interfacial Instabilities During Unidirectional Solidification of a Binary Alloy," J. Cryst. Growth 49, 13-28 (1980).

Coriell, S. R. and Cordes, M. R., "Effect of Gravity on Coupled Convective and Interfacial Instabilities during Directional Solidification," XXIII COSPAR Plenary Meeting, Budapest, Hungary, 1980, and Adv. Space Res. 1, 5-11 (1981).

Coriell, S. R., Boisvert, R. F., Rehm, R. G., and Sekerka, R. F., "Lateral Solute Segregation During Unidirectional Solidification of a Binary Alloy with a Curved Solid-Liquid Interface," J. Cryst. Growth 54, 167-175 (1981).

Coriell, S. R. and Cordes, M. R., "Theory of Molten Zone Shape and Stability," J. Cryst. Growth 42, 466-472 (December 1977).

Coriell, S. R. and Sekerka, R. F., "Effect of Convective Flow on Morphological Stability," Physiochem. Hydrodyn.

Crouch, R. K., et al., "High Gradient Furnace Studies Using Modular Design," Proceedings of Gordon Conference on Crystal Growth, Santa Barbara, CA, January 1979.

Crouch, R. K., Fripp, A. L., Clark, I. O., and Debham, W. J., "The Role of Thermophysics in the Design, Optimization and Understanding of Semiconductor Crystal Growth in Space," 14th Thermophysics Conference, Orlando, FL, June 4-6, 1979, AIAA Paper 79-1049.

Crouch, R. K., Fripp, A. L., et al., "Growth of $Pb_{1-x}Sn_xTe$: Earth Options and Space Opportunities," 157th Electrochemical Society Meeting, St. Louis, MO, May 1980.

Crouch, R. K., Fripp. A. L., Debnam, W. J., Taylor, R. E., and Groot, H., "Thermophysical Properties of Germanium for Thermal Analysis of Growth from the Melt," accepted for publication of Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Crouch, R. K., Fripp, A. L., et al., "Experiment Requirements and Implementation Plan (ERIP) for Semiconductor Growth in Low-G Environment, Experiment No. MPS 77F087," NASA TM-81943, February 1981.

Crouch, R. K., Debnam, W. J., and Ryan, R., "Vacuum Tight Quartz Ampoule for Bridgman Growth of Crystals with Interface Demarcation," J. Cryst. Growth 56, 215-216 (1982).

Crouch, R. K., Debnam, W. J., and Ryan, R., "Vacuum Tight Quartz Ampoule for Bridgman Growth of Crystals with Interface Demarcation," LAR-12899, Tech Brief, 1981.

Crouch, R. K., Debnam, W. J., and Taylor, R., "Vacuum Ampoule for Thermal Diffusivity Measurements of Corrosive Materials at High Temperatures," LAR-12898, Tech Brief, 1981.

Crouch, R. K., et al., "Optimization Studies for Growth of PbSnTe in Space," to be presented at American Ceramic Society Meeting, Cincinnati, Ohio, May 1982.

Crouch, R. K., Fripp, A. L., Debnam, W. J., Clark, I. O., and Carlson, F. M., "Ground-based Studies for the Space Processing of PbSnTe," accepted for publication in Proceedings of the Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Davidson, M. C. and Moynahah, A. H., "On the Dissolution Properties of GaAs in Ga," NASA TM-X-73368, January 1977.

Davis, J. H., Lal, R. B., Walter, H. U., and Castle, J. G., "Investigation of Crystal Growth in Zero Gravity Environment and Investigation of Metallic Whiskers," NASA CR-124065, December 1972, 225 pgs.

DeLong, M. C. and Rosenberger, F., "Stoichimetry and Purity of HgI_2," Mat. Res. Bull. 16, 1445 (1981).

Doty, J. P. and Reising, J. A., "Study of Single Crystals of Metal Solid Solutions," NAS8 29077, Final Report, May 1973, 86 pgs.

Drehman, A. J. and Turnbull, D., "Crystal Nucleation in Pd-Si Alloys," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Ettouney, H. M. and Brown, R. A., "Finite Methods for Steady Solidification Problems," submitted to Journal of Composite Physics, 1981.

Ettouney, H. M. and Brown, R. A., "Effect of Heat Transfer on Melt/Solid Interface Shape and Solute Segregation in Edge-Defined Film Growth: Finite Element Analysis," submitted to Journal of Crystal Growth, 1981.

Ettouney, H. M. and Brown, R. A., "Effects of Lateral Heat Transfer on Melt/Solid Interface Shape and Solute Segregation: Perturbation Analysis," submitted to International Journal of Heat & Mass Transfer, 1981.

Fripp, A. L. and Crouch, R. K., "Epitaxial $Pb_{1-x}Sn_xTe$ on BaF_2 Substrate," J. Electrochem. Soc. 124, 104C (1977).

Fripp, A. L. and Crouch, R. K., "Compositional Control Required in Alloy Semiconductors Used in High Performance Infrared Detector Arrays," Infrared Phys. 19, 701 (1979).

Fripp, A. L., Crouch, R. K., Debnam, W. J., Clark, I. O., and Ejim, T. I., "Anomalous Behavior in the First to Freeze Region in Directionally Solidified $Pb_{1-x}Sn_xTe$," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Fullmer, L. C. and Housley, R. M., "Crystal Growth from Melts in Zero-G Environments," NAR, February 5, 1970, 7 pgs.

Fullmer, L. D. and Housley, R. M., "Crystal Growth from Melts in Zero-G Environment," Space Processing and Manufacturing, October 21, 1969, pp. 383-388.

Catos, H. C., "Growth and Segregation Problems on Earth and in Space," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Gatos, H. C., Herman, C. J., Lichtensteiger, M., and Witt, A. F., "Quantitative Determination of Zero Gravity Effects on Crystal Growth from the Melt, Experiment MA-060," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114.

Gatos, H. C. and Lagowski, J., "Crystal Growth of Device Quality GaAs in Space," NSG-7731, Annual Report, April 1979, 95 pgs.

Gatos, H. C. and Witt, A. F., "Solidification (Crystal Growth) in the Presence of Gravitational Forces," Final Report, NAS8-30537, August 1978.

Gatos, H. C. and Witt, A. F., "Quantitative Determination of Zero Gravity Effects on Electronic Materials Processing Germanium Crystal Growth with Simultaneous Interface Demarcation," MIT, NAS8-30576, 1975.

Gatos, H. C. and Witt, A. F., "Indium Antimonide Crystal Growth-Skylab Experiment 562," NASA CR-120558, September 1974, 79 pgs.

Gatos, H. C., Witt, A. F., Lichtensteiger, M., and Herman, C. J., "Interface Marking in Crystals, Experiment MA-060," Apollo-Soyuz Test Project Summary Science Report, Vol. I, 1977, pp. 429-447.

Gatos, H. C., Lagowski, J., and Banisch, R., Surface Photovoltage Spectroscopy Applications to the Study of Photosensitive Surfaces and Interfaces," to be published in Photographic Science and Engineering, January 1982.

Gertner, E. R., Andrews, A. M., Bubulac, L. O., Cheung, D. T., Ludowise, M. J., and Riedel, R. A., "Liquid Phase Epitaxial Growth of $InAs_{1-x}Sb_x$ on GaSb," J. Elect. Mat. 8 (1979).

Ghias, L. and Wilcox, W. R., "Numerical Analysis of the Influence of Convection on Off-Eutectic Solidification," Met. Trans., in press.

Gillies, D. C., "Analysis of Mercury Cadmium Telluride by Energy Dispersive Analysis," accepted for publication in Journal of Electronic Materials, 1982.

Glicksman, M. E. and Huang, S. C., "Boundary-Layer Analysis for the Convection/Diffusion Transition in Dendritic Growth," Adv. Space Res. 1, 25-35 (1981).

Greenwell, D. W., Markham, B. L., and Rosenberger, F., "Numerical Modeling of Diffusive Physical Vapor Transport in Cylindrical Ampoules," J. Cryst. Growth 51, 413 (1981).

Gradzka, P. G., "Zero Gravity Solidification," Lockheed, Final Report, NAS8-21123, March 1970, 50 pgs.

Grodzka, P. G., Facemire, B. R., Johnston, M. H., and Gates, D., "Electrochemical Deposition of Silver Crystals Aboard Skylab IV," J. Cryst. Growth 35, 177-184 (1976).

Grodzka, P. G., Facemire, B. R., Johnston, M. H., and Gates, D., "Electrochemical Deposition of Silver Crystals Aboard Skylab IV," NASA TN-D-8277, July 1976, 43 pgs.

Grodzka, P. G. and Facemire, B. R., "Claus-Dickel Separation: A New Look at an Old Technique," Sep. Sci. 12, 103-169 (1977).

Grodzka, P. G., Johnston, M. H., and Griner, C. S., "Convection and Dendrite Crystallization," 15th Aerospace Sciences Meeting, Los Angeles, CA, January 1977, AIAA Paper 77-120.

Holland, L. R., "A Thermal Transmission Function for Fused Silica Ampoules," J. Cryst. Growth 49, 246 (1980).

Holland, L. R., "Crystal Growth Configuration Thermal Analysis," GAI, Final Report, September 1979, 21 pgs.

Irene, E. A. and Wiedemeier, H., "Knudsen Measurements in the Sublimation and the Heat of Formation of $GeSe_2$," Z. Anorg. Allg. Chem. 424, 277-286 (1976).

Irene, E. A. and Wiedemeier, H., "The Sublimation Kinetics of GeSe Single Crystals," Z. Anorg. Allg. Chem. 411, 182-192 (1975).

Isozuma, S., Herman, C. J., Okamoto, A., Lagowski, J., and Gatos, H. C., "A New Approach to Liquid Phase Electroepitaxy (LPEE) of III-V Compounds," J. Electrochem. Soc. 128, 2220 (1981).

Iwanczyk, J. S., Dabrowski, A. J., Del Duca, A., Huth, G. C., and Schnepple, W. F., "A Study of Low- Noise Preamplifier Systems for Use with Room Temperature Mercuric Iodide (HgI_2) X-Ray Detectors," IEEE Trans. Nuc. Sci. NS-28, 579 (1981).

Jain, V. K., "Utilization of Space Environment for Preparing Highly Perfect Crystals," NASA TM-X-64564, December 1970, 39 pgs.

Jastrzebski, L., Lagowski, J., Walukiewicz, W., and Gatos, H. C., "Determination of Carrier Concentration and Compensation Microprofiles in GaAs," J. Appl. Phys. 51, 2301-2303 (April 1980).

Jastrzebski, L., Lagowski, J., and Gatos, H. C., "Outdiffusion of Recombination Centers ffrom the Substrate into LPE Layers: GaAs," J. Electrochem. Soc. 126, 2231-2234 (1979).

Jastrzebski, L., Lagowski, J., and Gatos, H. C., "Formation of Recombination Centers in Epitaxial GaAs due to Rapid Changes of the Growth Velocity," J. Electrochem. Soc. 128, 697-699 (March 1981).

Jhaveri, B. S. and Rosenberger, F., "Expansive Convection in Vapor Transport Across Horizontal Rectangular Enclosures," Journal of Crystal Growth, in press.

Jhaveri, B. S., Markham, B. L., and Rosenberger, F., "On Singular Boundary Conditions in Mass Transfer Across Rectangular Enclosures," Chemical Engineering Communications, in press.

Jhaveri, B. S. and Rosenberger, F., "Exact Triple Integrals of Beam Functions," Journal Computer Physics, in press.

Johnston, M. H., "Preliminary Terrestrial Based Experiments on Gravity-Affected Crystal Growth," NASA TM-X-53999, March 13, 1970, 19 pgs.

Johnston, M. H., "Influence of Gravity on Growth Orientation of Tin Single Crystals," J. Cryst. Growth 11 (1973).

Johnston, M. H. and Baldwin, D. H., "The Influence of Acceleration Forces on Nucleation, Solidification and Deformation Processes in Tin Single Crystals," Met. Trans. 5, 2395-2399 (November 1974).

Kamiensiecki, E., Lagowski, J., et al., "Wavelength Modulated Phot-Capacitance Spectroscopy," J. Appl. Phys. 51, 1863 (1980).

Kamieniecki, E., Kazior, T. E., et al., "A Study of GaAs-Native Oxide Interface States by Transient Capacitance," 7th Annual Conference on the Physics of Compound Semiconductor Interfaces, Estes Park, Colorado, January 1980.

Kaminska, M., Lagowski, J., Parsey, J., Wada, K., and Gatos, H. C., "Oxygen-Induced Levels in GaAs," 1981 International Symposium on GaAs and Related Compounds, Tokyo, Japan, September 1981.

Kern, E. L., "Increased Uniformity of Silicon Needed for Critical Devices - How Can We Improve the Float Zone Process?" accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Kim, K. M., Witt, A.F. and Gatos, H.C., "Crystal Growth from the Melt Under Destabilizing Thermal Gradients", J. Electrochem. Soc. 119, 1218-1226 (September 1972).

Kim, K. M., Witt, A. F., Lichtensteiger, M., and Gatos, H. C., "Quantitative Analysis of the Effects of Destabilizing Vertical Thermal Gradients on Crystal Growth and Segregation: Ga-Doped Ge," J. Electrochem. Soc. 125, 475-480 (March 1978).

Knopf, F. W. and Guest, F. K., "Thermal Analysis of Bridgman-Stockbarger Growth," CAI, Final Technical Report, March 1979.

Lagowski, J., Gatos, H. C., Parsey, J. M., Wada, K., Kaminska, M., and Walukiewicz, W., "Origin of the 0.82 eV Electron Trap in GaAs and its Annihilation by Shallow Donors," submitted to Applied Physics Letters, 1981.

Lagowski, J., Kazior, T. E., Walukiewicz, W., Gatos, H. C., and Siejkz, J., "GaAs-Oxide Interface States: Gigantic Photoionization Effect and Its Implications to the Origins of these States," Appl. Phys. Lett. 39, 240 (1981).

Lal, R. B., "The Study of Crystals for Space Processing and the Effect of 0-Gravity," Final Report, NSG-8033, February 1977.

Lal, R. B. and Kroes, R. L., "Growth of Crystals by Solution Technique Onboard Spacelab III," 157th Electrochemical Society Meeting, St. Louis, MO, May 1980.

Lal, R. B., Kroes, R. L., and Wilcox, W. R., "Growth of Triglycine Sulfate (TGS) Crystals by Solution Technique," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Larson, D. J., Pirich, R. G., and Busch, G., "The Influence of Partial Mixing on Directionally Solidified Bi/MnBi Magnetic Composites," Fifth Conference on Crystal Growth, Fallen Leaf, CA, May 1980.

Larson, D. J. and Pirich, R. G., "Convective Influence on Eutectic and Off-Eutectic Plane-Front Solidification," Gordon Conference on Crystal Growth, Plymouth, NH, 1980.

Larson, D. J. and Pirich, R. G., "Characterization of Gravitationally Induced Convection on Solidification of the Bismuth-Manganese Eutectic," Fifth International Conference on Vapor Growth and Epitaxy, San Diego, CA, July 1981.

Larson, D. J. and Pirich, R. G., "Influence of Gravity Driven Convection on the Directional Solidification of Bi/MnBi Eutectic Composites," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Larson, D. J., Pirich, R. G., and Busch, G., "Convective Influence of Off-Eutectic Plane-Front Solidification of Bi/MnBi," submitted to Journal of Crystal Growth, 1981.

Lefever, R. A., Sarma, K. R., and Chang, C. E., "Microstructure and Composition of InSb-GaSb Ingots Directionall Solidified," AIAA 15th Aerospace Sciences Meeting, Los Angeles, CA, January 24-26, 1977, AIAA Paper 77-161.

Lefever, R. A., Wilcox, W. R., Sarma, K. R., and Chang, C. E., "Composition Variations in Directionally Solidified InSb-GaSb Alloys," Mat. Res. Bull. 13, 1181-1191 (1978).

Lefever, R. A., Wilcox, W. R., and Sarma, K. R., "Orientation, Twinning and Orientation-Dependent Reflectance in InSb-GaSb Alloys," Mat. Sci. Bull. 13, 1175-1180 (1978).

Lehoczky, S. L., Szofran, F. R., and Martin, B. G., "Advanced Methods for Preparation and Characterization of Infrared Detector Materials," NAS8-33107, Final Report, July 1980.

Lehoczky, S. L., Szofran, F. R., Summers, C. J., and Martin, M. "Electrical Characterization of $Hg_{1-x}Cd_xTe$ Alloys," accepted for in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Lehoczky, S. L. and Szofran, F. R., "Directional Solidification and Characterization of $Hg_{1-x}Cd_xTe$ Alloys," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Lehoczky, S. L. and Szofran, F. R., "Diffusion-Limited Directional Solidification of $Hg_{.8}Cd_{.2}Te$," Fifth International Conference on Vapor Growth/Fifth American Conference on Crystal Growth, Coronado, CA, July 19-24, 1981.

Lehoczky, S. L., Summers, C. J., and Szofran, F. R., "Directional Solidification and Characterization of $Hg_{1-x}Cd_xTe$ ($x < 0.25$)," presented at NATO Cadmium Mercury Telluride (CMT) Workshop, Grenoble, France, April 23-24, 1981.

Lind, M. D., "Crystal Growth - Experiment MA-028," Apollo Soyuz Test Project Summary Science Report, Vol. I, NASA SP-412, 1977.

Lind, M. D., "Crystal Growth from Solutions in Low Gravity," 15th Aerospace Sciences Meeting, Los Angeles, CA, January 24-26, 1977, AIAA Paper 77-197.

Lind, M. D., "Crystal Growth from Solutions in Low Gravity," AIAA Journal 16, 458-462 (May 1978).

Lind, M. D., Kroes, R. L., et al., "Liquid Phase Epitaxy (LPE) of Gallium Arsenide in Low Gravity," 157th Electrochemical Society Meeting, St. Louis, MO, May 1980.

Liu, L. C., Wilcox, W. R., Kroes, R. L., and Lal, R. B., "Modelling of TGS Growth in Space," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Markham, B. L., Greenwell, D. W., and Rosenberger, F., "Numerical Modeling of Physical Vapor Transport in Vertical Ampoules," J. Cryst. Growth 51, 426 (1981).

McDermit, J. H., "Solar Energy Concentrator System for Crystal Growth and Zone Refining in Space," Lockheed, NAS8-30268, February 1975, 89 pgs.

Miller, D. C., "The Role of Fluid Flow Phenomena in the Czochralski Growth of Oxides," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Miller, J. L., Austin, A. E., Single Crystals of Metal Solid Solutions," Battelle, NAS8-29875, Final Report, September 3, 1974, 47 pgs.

Miller, R. I., "Qualitative Effects of Oscillating Magnetic Fields on Crystal Melts," J. Cryst. Growth 20, 310-312 (1973).

Miyagawa, I., "Investigation of Crystal Growth from Solutions," NAS8-28098, Final Report, October 1975.

Mroczkowski, J. A. and Vydyanath, H. R., "Liquid Phase Epitaxial Growth of $(Hg_{1-x}Cd_x)Te$ from Tellurium-Rich Solutions Using a Closed Tube Tipping Technique," J. Electrochem. Soc. 128, 655-661 (March 1981).

Murgai, A., Chi, J. Y., and Gatos, H. C., "Microdistribution of Oxygen in Silicon," J. Electrochem. Soc. 127, 1182-1186 (May 1980).

Murgai, A., Gatos, H. C., and Witt, A. F., "Quantitative Analysis of Microsegregation in Silicon Grown by the Czochralski Method," J. Electrochem. Soc. 123, 224-229 (1976).

Nair, M., Fu, T. W., and Wilcox, W. R., "Response of Bi/MnBi Eutectic to Freezing Rate Changes," Fifth International Conference on Vapor Growth and Epitaxy," San Diego, CA, July 1981.

Naumann, R. J., "An Analytical Approach to Thermal Modeling of Bridgman-Type Crystal Growth, Part I: One-Dimensional Analysis," submitted to Journal of Crystal Growth, 1981.

Naumann, R. J., "An Analytical Approach to Thermal Modeling of Bridgman-Type Crystal Growth, Part II: Two-Dimensional Analysis," submitted to Journal of Crystal Growth, 1981.

Nelson, D. A., Higgins, W. M., and Lancaster, R. A., "Advances in (Hg, Cd)Te Materials Technology," SPIE 225, 47-54 (1980).

Okamoto, A., Lagowski, J., and Gatos, H. C., "Enhancement of Interface Stability in Liquid Phase Electroepitaxy," to be published in J. Applied Physics, March 1982.

Papazian, J. M. and Kattamis, T. Z., "Contained Polycrystalline Solidifcation in Low Gravity, Experiment 74-37," SPAR I Final Report, NASA TM-X-3458, December 1976.

Papazian, J. M. and Kattamis, T. Z., "Contained Polycrystalline Solidification in Low-G," SPAR V Final Report, NASA TM-78275, August 1980.

Parker, R. L., "Results of Crystal Growth in Skylab and ASTP," in Crystal Growth and Materials (eds., E. Koldis and H. J. Scheel), North Holland Press, 1977.

Parsey, J. M., Nanishi, Y., Lagowski, J., and Gatos, H. C., "Bridgman-Type Apparatus for the Study of Growth Property Relationships: Arsenic Vapor Pressure - GaAs Property Relationship," Journal of Electrochemical Society, in press, 1981.

Parsey, J. M., Nanishi, Y., Lagowski, J., and Gatos, H. C., "Electron Trap-Free Low Dislocation Melt-Grown GaAs," J. Electrochem. Soc. 128, 936 (1981).

Pirich, R. G., "Space Processing of Permanent Magnetic Composite Materials," NAS8-82219 and NAS8-32948, Annual Report of the Francis Bitter National Magnet Laboratory, 1978.

Pirich, R. G., "The Role of Processing Parameters on the Magnetic Properties of Directionally Solidified Bi/MnBi Composites," presented at Second Joint INTERMAG-Magnetism and Magnetic Materials (MMM) Conference, July 17-20, 1979.

Pirich, R. G., "Space Processing of Permanent Magnet Composite Materials Supoorted by the National Aeronautics and Space Administration," published in the Annual Report of the Francis Bitter National Magnet Laboratory, MIT, 1979.

Pirich, R. G. and Larson, D. J., "Magnetic and Metallurgical Properties of Directionally Solidified Eutectic Bi-MnBi Composites: The Effects of Annealing," J. Appl. Phys. 50, 2425-2427 (March 1979).

Potard, C., "Analysis and Control of Directional Solidified Differential Dilatometry: Application to InSb," J. Cryst. Growth 54, 558-571 (September 1981).

Potard, C., "A Review of the Mechanisms Involved in the Directional Solidification of Al-In Emulsions at Zero Gravity", J. Brit. Interplan. Soc. 31, 275-280 (1978).

Potard, C., "Etudes de Base Preparation de L'Experience de Solidification Dirigee D'Alliages Immiscible Al-In en Fusee Sonde," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 255-262.

Potard, C., "Directional Solidification of Al-In Alloys at Microgravity: Results of Basic Preparatory Investigators," 17th Aerospace Sciences Meeting, New Orleans, LA, January 1979, AIAA Paper 79-0173.

Potard, C., "Interet de Courtes Periodes D'Impesanteur Pour L'Etude de la Solidification des Alliages Immiscibles Al-In," Proceedings of Esrange Symposium, Ajaccio, April 1978, ESA SP-135.

Potard, C., "Structure of Immiscible Al-In Alloys Solidified Under Microgravity," presented at XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-140.

Potard, C., "Solidification of Hypermonotectic Al-In Alloys Under Microgravity Conditions," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Potard, C., "Directional Solidification of Immiscible Aluminum-Indium Alloys," SPAR IX Final Post-Flight Report, November 1981.

Robinson, A. L., "Crystal Growing in Space - Significance Still Up in the Air," Science, 187, 527-528 (February 14, 1975).

Rosenberger, F., "Fluid Dynamics in Crystal Growth from Vapors," J. Physchem. Hydrodyn. 1 (1980).

Rosenberger, F., "Convection in Vapor Crystal Growth Ampoules," in Convective Transport and Instability Phenomena (J. Zerep and H. Oertel, eds.), Braun Verlag, in press.

Roy, U., "Single Crystal Growth from Melt Under Space Environment," UAH, February 1970, 20 pgs.

Schnepple, W. F., Van den Berg, L., and Skinner, N., "Growth of HgI-2 Single Crystals in Spacelab III", J. Spacecraft 16, 440 (November-December 1979).

Schnepple, W. F., Van den Berg, L., and Skinner, N., "Growth of HgI_2 Single Crystals Aboard Spacelab III, 17th Aerospace Sciences Meeting. New Orleans, LA, January 1979, AIAA Paper 79-0307.

Sen, S. and Wilcox, W. R., "Influence of Crucible on Interface Shape Position and Sensitivity in the Vertical Bridgeman-Stockbarger Technique," J. Cryst. Growth 28, 36-40 (1975).

Sen, S., Lefever, R. A., and Wilcox, W. R., "Influence of Magnetic Fields on Vertical Bridgeman-Stockbarger Growth $In_xGa_{1-x}Sb$," J. Cryst. Growth 43, 52 (1978).

Sen, S. and Wilcox, W. R., "Non-Constant Distribution Coefficients for Directionally Solidified InSb-GaSb," Mat. Res. Bull. 13, 292-302 (1978).

Sen, S., Wilcox, W. R., and Lefever, R. A., "Annealing of $In_xGa_{1-x}Sb$ Ingots," Met. Trans. 9A, 462-472 (1978).

Siejka, J., Morawski, A., Lagowski, J., and Gatos, H. C., "Electric Charge in GaAs Native Oxides: Annealing Characteristics," Appl. Phys. Lett. 38, 552 (1981).

Szofran, F. R. and Lehoczky, S. L., "The Pseudobinary HgTe-CdTe Phase Diagram," submitted to J. Elect. Mat. 10, 1131 (1981).

Tiller, W. A. and Ahn, K. S., "Interface Field Effects on Solute Redistribution During Crystallization," J. Cryst. Growth 49, 483-501 (1980).

Trombka, J. I., Eller, E. L., et al., "Crystal Activation-Experiment MA-151," Apollo-Soyuz Test Project Summary Science Report, Vol. I, NASA SP-412, 1977, pp. 101-107.

Ulrich, D. R., Chung, A. M., Yan, C. S., and McCreight, L. R., "Economic Analysis of Crystal Growth in Space," Final Report, NAS8-27942, July 1972.

Ulrich, D. R., Noone, M. J., Spear, K. E., White, W. B., and Henry, E. C., "Crystal Growth in Fused Solvent Systems," Final Report, NAS8-28114, June 1973.

Van Den Berg, L. and Schnepple, W. F., "Growth of Single Crystals of Mercuric Iodide (HgI_2) in Spacelab III," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Von Schnering, H. G. and Wiedemeier, H., "The High Temperature Structure of β-SnS and the β16-to-B 33 Type Transition Path," Z. Kristallog. 156, 143 (1981).

Vydyanath, H. R., "Defect Studies in $Hg_{.8}Cd_{.2}Te$," presented at Conference on Crystal Growth and Characterization of II-VI Compounds, University of Lancaster, UK, April 14-16, 1980.

Vydyanath, H. R. "Point Defects in Doped and Undoped $Hg_{1-x}Cd_xTe$ Alloys, accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, '981.

Vydyanath, H. R., "Lattice Defects in $Hg_{1-x}Cd_xTe$ Alloys, I. Defect Structure of Undoped and Copper Doped $Hg_{.8}Cd_{.2}Te$, J. Electrochem. Soc. 128, 2609-2629 (December 1981).

Vydyanath, H. R., "Lattice Defects in $Hg_{1-x}Cd_xTe$ Alloys, II. Defect Structure of Indium Doped $Hg_{.8}Cd_{.2}Te$," submitted to Journal of Electrochemical Society, 1981.

Vydyanath, H. R., Donovan, J. C., and Nelson, D. A., "Lattice Defects in $Hg_{1-x}Cd_xTe$ Alloys, III: Defect Structure of $Hg_{.6}Cd_{.4}Te$," submitted to Journal of Electrochemical Society, 1981.

Vydyanath, H. R. and Abbott, W. C., "Mode of Incorporation of Phosphorus in $Hg_{0.8}Cd_{0.2}Te$," submitted to Journal of Applied Physics, November 1981.

Walter, H. U., "Evaluation of Semiconductor Specimens by X-Ray Analysis," NAS8-29650, Final Report, March 1975.

Walter, H. U., "Space Processing of Indium Antimonide Single Crystals by Seeded Containerless Solidification, Skylab Experiment M-560," Final Report, NAS8-28304, July 1978.

Walter, H. U. and Snyder, R. S., "Growth of Spherical Crystals of Indium with Respect to Crystal Growth in Space," J. Less Common Metals 24, 467-469 (1971).

Walukiewicz, W., Lagowski, J., and Gatos, H. C., "Electron Mobility in n-type GaAs at 77 K: Determination of the Compensation Ratio," Journal of Applied Physics, in press.

Wiedemeier, H., "Vapor Growth and Transport Rates of IV-VI Compounds in Microgravity," XX COSPAR Plenary Meeting, Tel Aviv, Israel, June 7-18, 1977, pp. 527-528.

Wiedemeier, H., "Growth of Single Crystals by Vapor Transport in Zero Gravity Environment, Ground-Based Experiments," NAS8-26146, Final Report, September 1971, 35 pgs.

Wiedemeier, H., Irene, E. A., and Chaudhari, A. K., "Crystal Growth by Vapor Transport of GeSe and GeTe and Transport Mechanism of GeTe," J. Cryst. Growth 13-14, 393-396 (1972).

Wiedemeier, H. and Csillig, F. J., "The Thermal Expansion and High Temperature Transformation of SnS and SnSe," Z. Kristallo. 149, 17-29 (1979).

Wiedemeier, H. and Csillig, F. J., "Transpor Properties of the Systems SnI_4 and SnS_2-I_2," J. Cryst. Growth 46, 189-197 (1979).

Wiedemeier, H., Csillag, F. J., and Gaur, U., "Heat Capacity Measurements of Sn_2S_3 and the Thermodynamic Functions of the Tin Sulfides," Thermochem Acta 35, 187 (1980).

Wiedemeier, H. and Csillag, F. J., "The Decomposition and Thermodynamic Properties of Sn_2S_3," Z. Anorg. Allg. Chem. 469, 197 (1980).

Wiedemeier, H. and Csillag, F. J., "The Decomposition and Thermodynamic Properties of SnS_2," High Temp. Sci. 12, 277 (1980).

Wiedemeier, H., Pultz, G., and Gaur, U., "Heat Capacity Measurements of SnSe and $SnSe_2$," Thermochem. Acta 43, 297 (1981).

Wiedemeier, H., Klaessig, F. C., Wey, S. J., and Irene, E. A., "Vapor Growth of GeSe and GeTe Single Crystals in Microgravity," Third Space Processing Symposium: Skylab Results, Vol. I, M-74-5, June 1974, pp. 235-256.

Wiedemeier, H., Klaessig, F. C., Irene, E. A., and Wey, S. J., "Crystal Growth and Transport of GeSe and GeTe in Microgravity Environment," J. Cryst. Growth 31, 36-43 (1975).

Wiedemeier, H., Chandra, D., and Klaessig, F. C., "Diffusive and Convective Vapor Transport in the GeSe-GeI_4 System," J. Cryst. Growth 51, 345-361 (February 1981).

Wiedemeier, H. and Irene, E. A., "The Chemical Transport Rates and Crystal Morphology of GeSe," Z. Anorg. Allg. Chem. 400, 59-66 (1973).

Wiedemeier, H. and Chandra, D., "Chemical Vapour Transport and Crystal Growth of the $Hg_{0.8}Cd_{0.2}Te$ System, Crystal Morphology and Homogeneity," Z. Anorg. Allg. Chem., in press.

Wiedemeier, H. and Irene, E. A., "Knudsen Measurements of the Sublimation and the Heat of Formation of GeSe," Z. Anorg. Allg. Chem. 404, 299-307 (1974).

Wiedemeier, H., Sadeek, H., Klaessigg, F. C., Norek, M., and Santandrea, R., "Crystal Growth from the Vapor Phase," Apollo-Soyuz Test Project Science Summary Report, Vol. I, NASA SP-412, 1977, pp. 471-489.

Wiedemeier, H., Sadeek, H., Klaessig, F. C., Norek, M., and Santandrea, R., "Crystal Growth from the Vapor Phase, Experiment MA-085," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114.

Wiedemeier, H., Sadeek, H., Klaessig, F. C., Norek, M., and Santandrea, R., "Morphology and Transport Rates of Mixed IV-VI Compounds in Microgravity," J. Electrochem. Soc. 124, 1095-1102 (1977).

Wiedemeier, H., Siemers, P. A., Gaur, U., and Wunderlich, B., "Heat Capacity Measurements of GeS, GeSe, and GeTe," Thermochim Acta. 27, 227- 231 (1978).

Wiedemeier, H. and Siemers, P. A., "The Thermal Expansion of GeSe and GeTe," Z. Anorg. Allg. Chem. 431, 299-304 (1977).

Wiedemeier, H. and Siemers, P. A., "The Thermal Expansion and High Temperature Transformation of GeSe," Z. Anorg. Allg. Chem. 441, 90-96 (1975).

Wiedemeier, H. and Chandra, D., "Chemical Vapor Transport, Crystal Growth, Thermodynamic and Fluid Dynamic Analysis of the $Hg_{1-x}Cd_xTe$ System," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Wiedemeier, H. and Chandra, D., "Chemical Vapor Transport and Thermal Behavior of the GeSe-GeI_4 System for Different Inclinations with Respect ot the Gravity Vector, Comparison with Theoretical and Microgravity Data," J. Cryst. Growth 56 (1982).

Wiedemeier, H., Gaur, U., et al., "Analysis of the Heat Capacities of Group IV Chalcogenides Using Debye Temperatures," Journal of Thermal Analysis, in press.

Wiedemeier, H., Chandra, D., Yang, P. H., and Koniowka, W. J., "Crystal Growth and Chemical Transport Properties of $Hg_{1-x}Cd_xTe$ and $CuInS_2$," Proceedings of Eighth International Conference on Chemical Vapor Deposition 1981, Gouvieux, France, (The Electrochemical Society), Vol. 81-7, p. 157 (1981).

Wilcox, W. R. and Chang, C. E., "Thermocapillary Convection in Floating Zone Melting," Third American Conference on Crystal Growth, Stanford, CA, July 14, 1975.

Wilcox, W. R., Lal, R. B., Sarma, K., and Lin, M. C., "Crystallization in Space," presented at Second World Congress of Chemical Engineering, Montreal, Canada, October 4-9, 1981.

Wilcox, W. R., Yee, J. F., Shlichta, P. J., Chen, P. S., and Kim, C. K., "Mixed III-V Crystal Growth in Very Low Accelerational Fields," NAS8-28305, December 1974, 90 pgs.

Wilcox, W. R., Chang, C. E., et al., "Analytics of Crystal Growth in Space," NAS8-29847, Final Report, December 1975, 115 pgs.

Witt, A. F., "Overview of Crystal Growth Experiments on ASTP," Second. Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976.

Witt, A. F., "Crystal Growth and Segregation in Space: A Critical Assessment Based on Results Obtained During the ASTP Mission," XXI Plenary COSPAR Meeting, Innsbruck, Austria, May 29-June 10, 1978, pp. 503-506.

Witt, A. F., Gatos, H. C., Lictensteiger, M., Lavine, M. C., and Herman, C. J., "Crystal Growth and Steady State Segregation Under Zero Gravity: InSb," J. Electrochem. Soc. 122, 276-283 (1975).

Witt, A. F., Gatos, H. C., and Lichtensteiger, M., "Steady State Growth and Segregation under Zero Gravity: InSb," Third Space Processing Symposium: Skylab Results, Vol. I, M-74-5, June 1974, pp. 275-301.

Witt, A. F., Lichtensteiger, M., et al., "Application of Interface Demarcation to the Study of Facet Growth and Segregation: Germanium," J. Electrochem. Soc. 121, 787-790 (June 1974).

Witt, A. F., Lichtensteiger, M., and Gatos, H. C., "Experimental Approach to the Quantitative Determination of Dopant Segregation During Crystal Growth on a Microscale: Ga Doped Ge," J. Electrochem. Soc., 1119-1123 (1973).

Workman, G., "Vapor Transport Mechanisms," NAS8-31731, Final Report, August 7, 1978, 32 pgs.

Yang, X. F., Huang, L., and Gatos, H. C., "Selective Epitaxial Growth of GaAs by Liquid Phase Electroepitaxy," to be published in Journal of Electrochemical Society, January 1982.

Yee, J. F., Lin, M. C., Sarma, K., and Wilcox, W. R., "The Influence of Gravity on Crystal Defect Formation in InSb-GaSb Alloys," J. Cryst. Growth 30, 185-192 (1975).

Yee, J. F., Sen, S., Sarma, K., Lin, M., and Wilcox, W. R., "Directional Solidification of InSb-GaSb Alloys," Third Space Processing Symposium: Skylab Results, Vol. I, M-74-5, June 1974, pp. 301-374.

Yue, A. S., Yeh, C. W., and Yue, B. K., "Zero Gravity of NaCl-LiF Eutectic, Experiment MA-131," Apollo-Soyuz Test Project Final Science Report, NASA TM-X-73360, January 1977.

Yue, J. T. and Voltmer, F. W., "Influence of Gravity-Free Solidification on Solute Microsegregation," J. Cryst. Growth, 29, 329-341 (1975).

Yue, J. T. and Voltmer, F. W., "Influence of Gravity-Free Solidification on Microsegregation," Third Space Processing Symposium: Skylab Results, Vol. I, M-74-5, June 1974, pp. 375-425.

Zoutendyk, J. A. and Akutagawa, W. M., "Gravity-Driven Convection Studies in Compound Semiconductor Crystal Growth by Physical-Vapor Transport," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Zoutendyk, J. A. and Akutagawa, W. M., "Mass Transport in the Physical Vapor Growth of PbTe, SnTe, and Their Alloys, I. Results of PbTe," submitted to Journal of Crystal Growth, 1981.

Zoutendyk, J. A. and Akutagawa, W. M., "Diffusive-Convective Physical Vapor Transport of PbTe from a Te-Rich Solid Source," J. Cryst. Growth 56, 245-253 (1982).

Metals, Alloys, and Composites

Anderson, W. T. and Reger, J. L., "Superconducting Properties of Pb-Sn-In Alloys Directionally Solidified Aboard Skylab," 10th Thermophysics Conference, Denver, CO, May 27-29, 1975, AIAA Paper 75-694.

Andrews, J. B., Arita, M., and Masubuchi, K., "Analysis of Thermal Stress and Metal Movement During Welding," NASA CR-61351, December 1970, 279 pgs.

Ang, C. Y. and Lacy, L. L., "Gravitational Influences on the Liquid-State Homogenization and Solidification of Aluminum Antimonide," Met. Trans. 10A, (May 1980).

Ang, C. Y. and Lacy, L. L., "Low Gravity Homogenization and Solidification of Aluminum Antimonide," COSPAR 19th Plenary Meeting, Philadelphia, PA, June 1976, Paper D.2.1.

Ang, C. Y. and Lacy, L. L., "Monotectic and Syntectic Alloys, ASTP Experiment MA-044," Postflight Preliminary Technical Report, NASA TM-X-64956, September 1975, 45 pgs.

Angers, L. M., Grugel, R. N., Hellawell, A., and Draper, C. W., "Selective Etching and Laser Melting Studies of Monotectic Composite Structures," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Aubin, W. M., Larson, D. J., and Geschwind, G. I., "Research of Metal Solidification in Zero-G State Test Apparatus and Instrumentation," Grumman, NAS8-28604, September 1973, 74 pgs.

Bannister, T. C. and Richard, B. E., "Microscopic Observation of Interfacial Phenomena," 7th Aerospace Sciences Meeting, New York, NY, January 20-22, 1969, AIAA Paper 69-95.

Bayuzik, R., Evans, N., Rathz, T., and Robinson, M., "Solidification Studies of Nb-Ge Alloys in Large Degrees of Supercooling," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Bhat, B. N., "Concentration Changes During Eutectic Solidification," Third Space Processing Symposium: Skylab Results, Vol. 2, M-74-5, June 1974, pp. 953-963.

Boettinger, W. J., Coriell, S. R., Biancaniello, F. S., and Cordes, M. R., "Solutal Convection Induced Macrosegregation and the Dendrite to Composite Transition in Off-Eutectic Alloys," Met. Trans. A, 12A, 321-327 (1981).

Boettinger, W. J., Cahn, J. W., Coriell, S. R., and Manning, J., "Application of Solidification Theory to Rapid Solidification Processing," Semi-Annual Technical Report (April 1-September 30, 1979), October 1979, 19 pgs.

Bonnell, D. W., Treverton, J. A., Valerga, A. J., and Margrave, J. L., "The Emissivities of Liquid Metals at Their Fusion Temperatures," NASA CR-133521, August 1971.

Bourgeois, S. V. and Doty, J. P., "Convection Sensitivity and Thermal Analyses for Indium and Indium-Lead Mixing Experiment (74-18), Lockheed, NAS8-31671, May 1976.

Brashears, M. R. and Robertson, S. J., "Research Study on Materials Processing in Space Experiment M512," Final Report, NAS8-28729, December 1973, 140 pgs.

Braski, D. N., Adair, H. L., and Kobisk, E., "Radioisotope Tracer Stunies in the NASA Skylab Exothermic Brazing Experiment M522," NASA CR-129035, September 1974.

Chang, M. R. W., "Studies on Cuprous Chloride Containing a Dispersed Second Phase of Alumina Particles," Masters Thesis, Arizona State University, December 1978.

Chang, M. R. W., Shahi, K., and Wagner, J. B., "The Influence of a Dispersed Second Phase of Ionic Conduction in Solid State Electrolytes," 17th Aerospace Sciences Meeting, New Orleans, LA, January 15-17, 1979, AIAA Paper

Chang, M. R. W., Shahi, K., Pack, S., and Wagner, J. B., "Electrical Conductivity of the Solid Electrolyte System $CuCl(Al_2O_3)$," Electrochemical Society Meeting, Boston, MA, May 1979, Abstract No. 367.

Choudhary, M. and Szekely, J., "The Effect of Temperature Dependent Electrical Conductivity on Flow and Temperature Fields in Slags in ESR Systems," submitted to Met. Trans., 1981.

Coriell, S. R., "Lateral Solute Segregation During Unidirectional Solidification of a Binary Alloy with a Curved Solid-Liquid Interface," J. Cryst. Growth 46, 479-482 (April 1979).

Das, D. and Kumar, K., "New Technologies for Fabricating Improved Sm-Co Magnets," Proceedings of the Third International Workshop on Re-Co Magnets and Their Applications, University of California, San Diego, 1978.

DeSmet, D. J., "Ellipsometric Measurements of Epitaxial GaAs Layers on a GaAs Substrate," NAS8-29494, April 1973.

Donaghey, L. F. and Tiller, W. A., "On the Diffusion of Solute During the Eutectoid and Eutectic Transformations, Part I," Mat. Sci. Engr., 3, (1968).

Douglas, F. C. and Galasso, S. F., "Eutectic Solidification," Third Space Processing Symposium, Vol. II, M-74-5, June 1974, pp. 939-953.

Dubec, P. M. and Wagner, J. B., "Electrical Conductivity Studies on Undoped Cadmium Doped and Sulfur Doped CuBr and on CuBr Containing Al_2O_3 Particles," Abstract No. 135, Electrochemical Society Meeting, Los Angeles, CA, October 14-19, 1979.

Fabiniak, T. J., "Investigation of Zero Gravity Effects on Material Properties," Final Report, NASA CR-102874, April 1970, 61 pgs.

Frazier, D. O., "Solidification Phenomena," presented at TMS-AIME Annual Fall Meeting, Louisville, KY, October 12-13, 1981.

Frost, R. T., "Weightless, Containerless Melting and Solidification of Potential New Metal and Ceramic Products," Space Processing and Manufacturing Meeting, ME-69-1, October 1969, 20 pgs.

Frost, R. T., "Techniques and Examples of Zero-G Melting Solidification Processes," Unique Manufacturing Processes in Space Environment, ME-70-1, April 1970, p. 12.

Gelles, S. H., "Immiscible Materials and Alloys," Third Space Processing Symposium: Skylab Results, M-74-5, Vol. II, June 1974, pp. 1003-1031.

Gelles, S. H., "Microgravity Studies in the Liquid Phase Immiscible System Aluminum-Indium," 15th Aerospace Sciences Meeting, Los Angeles, CA, January 24-26 977, AIAA Paper 77-122.

Gelles, S. H., Bhat, B. N., and Laub, R. J., "Phase Separation in Transparent Liquid-Liquid Miscibility Gap Systems," presented at Workshop on NASA Fluids Experiment System (FES), UAH, Huntsville, AL, July 11-12, 1979.

Gelles, S. H., Collings, E. W., Abbott, W. H., and Maringer, R., "Analytical Study of Space Processing of Immiscible Materials for Superconductors and Electrical Contacts," NASA CR-150156, Final Report, January 1977.

Gelles, S. H. and Malik, R. K., "Process Development for Producing Fine-Grain Castings in Space," Battelle, NAS8-29626, Final Report, April 1975, 59 pgs.

Gelles, S. H. and Markworth, A. J., " Agglomeration in Immiscible Liquids," SPAR V Final Report, NASA TM-78275, August 1980.

Gelles, S. H., and Markworth, A. J., "SPAR II, Experiment 74-30: Agglomeration in Immiscible Liquids," Final Report, NASA TM-78125, November 1975.

Gelles, S. H. and Markworth, A. J., "Microgravity Studies in the Liquid-Phase Immiscible System: Aluminum-Indium," AIAA Journal 16, 431-438 (May 1978).

Gelles, S. H., Markworth, A. J., Oldfield, W., and Duga, J., "Investigation of Immiscible Systems and Potential Applications," NAS8-29748, Final Report, April 1975, 111 pgs.

Glicksman, M. E., "Capillary Phenomena During Solidification," J. Cryst. Growth, 42, 347-356 (1977).

Glicksman, M. E., "Convective Heat Transfer During Dendritic Solidification," 16th Aerospace Sciences Meeting, Huntsville, AL, January 1978, AIAA Paper 78-220.

Glicksman, M. E., "Gravity-Induced Convection During Dendritic Solidification," XXI COSPAR Plenary Meeting, Innsbruck, Austria, June 1978.

Glicksman, M. E., "Influence of Spatial Orientation on the Kinetics of Convective-Diffusive Dendritic Growth," Fourth American Conference on Crystal Growth, NBS, Washington, D.C., July 18, 1978.

Glicksman, M. E., "Transition from Diffusive to Convective Transport During Dendritic Solidification-A Basis for Future Experimentation at Reduced Gravity," 18th Aerospace Sciences Meeting, Pasadena, CA, January 14, 1980.

Glicksman, M. E., "Convective Flow During Dendritic Growth," Fluids Experiments System Workshop (FES), Huntsville, AL, July 1979.

Glicksman, M. E., "Gravitational Influence on Eutectic Solidification," presented at TMS-AIME Meeting, Louisville, KY, October 12-13, 1981.

Glicksman, M. E. and Huang, S. C., "Relationships of Microstructure and Kinetics to Supercoolings and Cooling Rate," in Rapid Solidification Processing, Principles and Technologies II, edited by R. Mehrabian, B. H. Kear, and M. Cohen, Claitor's Publishing Division, Baton Rouge, LA, 1980.

Glicksman, M. E. and Huang, S. C., "Convection and Diffusion Effects During Dendritic Solidification," 17th Aerospace Sciences Meeting, New Orleans, LA, January 1979, AIAA Paper 79-0029.

Glicksman, M. E. and Huang, S. C., "Convective Herat TRansfer During Dendritic Growth," in Convective Transport and Instability Phenomena (ed. H. Oertel), 1981.

Glicksman, M. E. and Huang, S. C., "Transport Phenomena in Dendritic Growth Processes," Proceedings of the 87th AIChE Meeting, Special Symposium on "Transport Phenomena in Phase Change Processes," Boston, MA, August 1979.

Glicksman, M. E. and Huang, S. C., "Fundamentals of Dendritic Solidification, Part I - Steady State Tip Growth," Acta Met. 29, 701-715 (1981).

Glicksman, M. E. and Huang, S. C., "Fundamentals of Dendritic Solidification, Part II - Development of Sidebranch Structure," Acta Met. 29, 717-734 (1981).

Glicksman, M. E. and Huang, S. C., "Convective Heat Transfer During Dendritic Growth," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 309-312.

Glicksman, M. E., Singh, N. B., and Chopra, M., "Influence of Diffusion and Convective Transport on Dendritic Growth in Dilute Alloys," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Grugel, R. N., Lograsso, T. A., and Hellawell, A., "Directional Solidification of Alloys in Systems Containing a Liquid Miscibility Gap," presented at TMS-AIME Annual Fall Meeting, Louisville, KY, October 12-13, 1981.

Grugel, R. N., Lograsso, T. A., and Hellawell, A., "Directional Solidification of Alloys in Systems Containing a Liquid Miscibility Gap," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Grugel, R. N. and Hellawell, A., "Alloy Solidification in Systems Containing a Liquid Miscibility Gap," Met. Trans. A 12A, 669-681 (April 1981).

Grugel, R. N., and Hellawell, A., "The Occurence of Aligned Microstructures in Directionally Solidified Aluminum-Bismuth Alloys," Met. Trans., in press.

Hammel, R. L., Kirkpatrick, M. E., and Reger, J. L., "Reduced Gravity Processing of Homogenized Immiscible Metal Alloys," Space Processing and Manufacturing, ME-69-1, October 1969, pp. 183-184.

Hardy, S C. and Fine, J., "Studies of Liquid Metal Surfaces Using Auger Spectroscopy," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Hasemeyer, E. A., Lovoy, C. V., Lacy, L. L., "Skylab Experiment M566 Copper-Aluminum Eutectic," Third Space Processing Symposium, Vol. I, M-74-5, June 1974, pp. 457-469.

Huang, S. C., "Dendritic Growth at Small Supercoolings," RPI, Ph.D. Thesis, December 1979, 108 pgs.

Huang, S. C. and Glicksman, M. E., "The Influence of Natural Convection on Dendritic Growth," submitted to Journal of Crystal Growth, 1981.

Johnson, A. A., Anatatmuka, R. P., Horylev, R. J., Gupta, S. P., and Vatne, R. S., "The Solidification under Zero-Gravity Conditions of Binary Alloys Exhibiting Solid State Immiscibility," NASA CR-144302, Final Report, October 1975.

Johnson, P. C., "Development of Techniques for Processing Metal-Metal Oxide Systems," NASA CR-150120, Final Report, October 1976, 32 pgs.

Johnson, P. C. and Peters, E. T., "M533 Research Study on Materials Processing in Space - Sphere Forming," NAS8-28723, Final Report, December 1973.

Johnston, M. H. and Griner, C. S., "The Direct Observation of Solidification as a Function of Gravity Levels," SPAR I Final Report, NASA TM-X-3458, December 1976.

Johnston, M. H. and Griner, C. S., "The Direct Observation of Solidification as a Function of Gravity Level," Met. Trans. 8A, 77 (January 1977).

Johnston, M. H. and Griner, C. S., "The Direct Observation of Dendrite Remelting and Macrosegregation in Casting," SPAR V Final Report, NASA TM-78275, August 1980.

Johnston, M. H. and Griner, C. S., "Compositional Variations in the Undercooled Pb-Sn Eutectic Solidified at Various Acceleration Levels," Scripta Met. 2, 253-255 (1977).

Johnston, M. H. and Owen, R. B., "Study of Optical Techniques for the Observation of Gravity Related Fluid Flow During Solidification," J. Electrochem. Soc. 127, 138C (1980).

Johnston, M. H., Griner, C. S., Parr, R. A., and Robertson, R., "The Direct Observation of Unidirectional Solidification as a Function of Gravity Level," J. Cryst. Growth 50, 831-838 (1980).

Johnston, M. H. and Parr, R. A., "Directional Solidification of Aligned Monotectic and Hypermonotectic Materials," Proceedings of Conference on In-Situ Composites III, Boston, MA.

Johnston, M. H. and Parr, R. A., "The Effect of a Low Gravity Environment on Porosity Formation," presented at TMS-AIME Annual Fall Meeting, Louisville, KY, October 12-13, 1981.

Johnston, M. H. and Parr, R. A., "Low-Gravity Solidification Structures in the Sn-15wt%Pb and Sn-3wt%Bi Alloys," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Kattamis, T. Z., "Investigation of Solidification in Zero Gravity Environment: M553 Evaluation of Skylab Specimens," NAS8-28734, December 1973, 43 pgs.

Kaukler, W. F. S., "A Quantitative Study of Factors Influencing Lamellar Eutectic Morphology During Solidification," NASA TM-82451, November 1981, 262 pgs.

Kawada, T., "Preparation of Silicon Carbide Whisker Reinforced Silver Composite Materials in a Weightless Environment, Skylab Experiment M561," Third Space Processing Symposium: Skylab Results, Vol. I, June 1974, M-74-5, pp. 203-233.

Kaye, S. and Raat, J., "Low-Gravity Dispersion of Solids in Liquid Metals," Third Space Processing Symposium: Skylab Results, June 1974, Vol. II, M-74-5, pp. 857-885.

Kidron, A., "Banding Due to Temperature Oscillations in the Undirectional Solidification of Eutectic Alloys," NASA CR-61391, 1972.

Kuriyama, M., Boettinger, W. J., and Burdette, H. E., "Crystal Perfection in Czochralski Grown Nickel Single Crystals," J. Cryst. Growth 43, 287-300 (1978).

Kuriyama, M., Boettinger, W. J., and Burdette, H. E., "X-Ray Surface Reflection and Transmission Topography of Magnetic Domain Walls in Czochralski Grown Nickel Single Crystals," J. Mat. Sci. 12, 353-357 (1977).

Kuriyama, M. and Boettinger, W. J., "On the Angular Divergence of Outgoing Beams in Asymmetric Diffraction Geometry," Acta Cryst. 32A, 511-512 (1976).

Kuriyama, M., Boettinger, W. J., and Burdette, H. E., "X-Ray Topographic Observations of Magnetic Domains in Czochralski Gorwn Nickel Single Crystals in Anomalous Transmission Geometry," J. Appl. Phys. 47, 5064-5068 (1976).

Kuriyama, M., Boettinger, W. J., and Burdette, H. E., "Crystal Imperfections and Magnetic Domain Walls in Thick Czochralski-Grown Nickel Single Crystals," Adv. X-Ray Analysis 20, 245-257 (1977).

Lacy, L. L. and Ang, C. Y., "Montectic and Syntectic Alloys, Experiment MA-044," Apollo-Soyuz Test Project Summary Science Report, Vol. I, NASA SP-412, 1977, pp. 403-427.

Lacy, L. L. and Otto, G. H., "Electrical Resistivity of Gallium-Bismuth Solidified in Free Fall," AIAA Journal 13, 219-220 (February 1975).

Lacy, L. L. and Otto, G. H., "The Electrical Properties of Zero-Gravity Processed Immiscibles," 12th Aerospace Sciences Meeting, Washington, D.C., February 1974, AIAA Paper 74-208.

Lacy, L. L., Witherow, W. K., and Facemire, B. R., "Optical Studies of a Model Binary Miscibility Gap System," presented at TMS-AIME Annual Fall Meeting, Louisville, KY, October 12-13, 1981.

Lacy, L. L., Rathz, T. J., and Robinson, M. B., "Containerless Undercooling and Solidification of Bulk Metastable Nb_3Ge Alloys," presented at TMS-AIME Annual Fall Meeting, Louisville, KY, October 12-13, 1981.

Lacy, L. L., Robinson, M. B., and Rathz, T. J., "Containerless Supercooling and Solidification in Drop Tubes," J. Cryst. Growth 51, 47-60 (1981).

Lacy, L. L., Rathz, T. J., and Robinson, M. B., "Containerless Undercooling and Solidification of Bulk Metastable Nb_3Ge Alloys," submitted to Journal of Applied Physics, 1981.

Larson, D. J.,"Zero-G Processing of Magnets, Exp. MA-070," Final Report, NAS8-30577, December 1976.

Larson, D. J., "Effects of Gravity Reduction of Phase Equilibria Phase 2 - Binary Two-Phase Solids," Grumman Aerospace, NAS8-28728, July 1976.

Larson, D. J., "Effects of Gravity Reduction of Phase Equilibria Part I - Unary and Binary Isostructural Solids," Grumman Aerospace, NAS8-28728, September 1975.

Larson, D. J., "Zero-G Processing of Magnets, Experiment MA-070," Apollo-Soyuz Test Project Summary Science Report, Vol. I., NASA SP-412, 1977.

Larson, D. J., "Skylab M553 Sphere Forming Experiment," Third Space Processing Symposium, M-74-5, Vol. 1, June 1974, pp. 101-115.

Larson, D. J., "Investigation of Ground Based Simulation Skylab Samples - Final Report on Phase B," Grumman, NAS8-28728, August 1973.

Larson, D. J. and Aubin, W., "Specimen Analysis of Skylab M553 Metals Melting and Solidification Experiment," presented at 20th AAS Annual Meeting, USC, Los Angeles, CA, August 1974.

Larson, D. J. and Busch, G., "Investigation of KC-135 Flight Samples Solidified in Near-Zero Gravity," NASA CR-124179, January 1973, 36 pgs.

Larson, D. J., Li, Ci, Busch, G., "Specimen Analysis of Skylab M553 Metals Melting and Solidification Experiment," NASA CR-28728, February 1974.

Larson, D. J. and Pirich, R. G., "Influence of Gravity Driven Convection on the Directional Solidification of Bi/MnBi Eutectic Composites," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Li, C. H., "Segregation Effects During Solidification in Weightless Melts," NASA CR-124358, June 1973, 350 pgs.

Li, C. H., "Normal Evaporation of Binary Alloys," NASA CR-124040, November 1972, 29 pgs.

Li, C. H., "Normal Freezing of Ideal Ternary Systems of the Pseudobinary Type," NASA CR-129934, November 1972, 21 pgs.

Markworth, A. J., Gelles, S. H., and Oldfield, W., "Separation Kinetics of Immiscible Liquids in a Low-Gravity Environment," in Computer Simulation for Materials Applications (eds. R. J. Arsenalt, J. R. Becker, and J. A. Simmons), 1978.

Masubuchi, K., "Integration of NASA-Sponsored Studies on Aluminum Welding," NASA CR-20641, June 1972, 321 pgs.

McKannan, E. C., "Metallurgical Processing in Space," AIAA/AGU Conference on Scientific Experiments of Skylab, Huntsville, AL, AIAA Paper 74-1239, November 1974.

McKannan, E. C. and Poorman, R. M., "Skylab M551 Metals Melting Experiment," Third Space Processing Symposium: Skylab Results, Vol. I, June 1974, M-74-5, pp. 85-99.

McNutt, R. C., "Solidification Kinetics," Final Report, NAS8-30561, September 26, 1975, 13 pgs.

Miller, R. I., "Study of Liquid-Solid Transition for Materials Processing in Space," NASA CR-12494, May 1973, 47 pgs.

Miller, R. I. and Johnston, M. H., "Theoretical Aspects of Undercooling Nucleation and Growth of Metals in Space," 15th Aerospace Sciences Meeting, Los Angeles, CA, January 24-26, 1977, AIAA Paper 77-164.

Miller, R. I., Lindenmeyer, P. H., and Johnston, M. H., "The Interaction of Undercooling and Gravitation Fields During Solidification," DC2 Bulletin of the American Physical Society, December 1975.

Moak, D. P., Griesenauer, N. M., and Gelles, S. H., "Undercooling of Materials During Solidification in Space," Battelle, NAS8-28749, Final Report, April 1975.

Monroe, R. E., "Characterization of Metals Melting Discs Skylab Experiment M551," Battelle, NAS8-28725, Final Report, December 1973.

Monroe, R. E. and Pattee, H. E., "Characterization of Exothermic Brazing Components Skylab Experiment M522," NAS8-28725, Final Report, December 1973.

Mukherjee, J. L., Gupta, K. P., and Li, C., "Evaporation Segregation in 80% Ni, 20% Cr and 60% Fe, 40% Ni Alloys," NASA CR-123993, October 1972, 15 pgs.

Mukherjee, J. L., Gupta, K. P., and Li, C., "Purification Kinetics of Beryllium During Vacuum Induction Melting," NASA CR-123946, October 1972, 22 pgs.

Nair, M., Doddi, K., Fu, T. W., Wilcox, W. R., Ravishankar, P., and Larson, D. J., "Response of MnBi-Bi Eutectic to Freezing Rate Changes," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Nishioka, G. M., Lacy, L. L., and Facemire, B. R., "The Gibbs Surface Excess in Binary Miscibility Gap Systems," J. Colloid & Interface Sci. 80, 197-207 (March 1981).

Nishioka, G. M., Lacy, L. L., and Facemire, B. R., "The Gibbs Surface Excess in Binary Miscibility Gap Systems," J. Colloid & Interface Sci. 80, 197-207 (March 1981).

O'Hara, S. and Tiller, W. A., "On the Mechanisms of Crysta Multiplication During Solidification in the Presence of Fluid Motion," Trans. Met. Soc. of AIME, 239, 497 (April 1967).

Otto, G. H., "Low Gravity Processing of Superconducting Compounds" NAS8-31768, Final Report, November 1976.

Otto, G. H., "Studies on Immiscible Alloys," NAS8-27809, Final Report, January 1976.

Otto, G. H. and Lacy, L. L., "Observation of the Liquid/Solid Interface in Low Gravity Melting," AIAA/AGU Conference on Scientific Experiments of Skylab, Huntsville, AL, AIAA Paper 74-1243, November 1, 1976.

Otto, G. H. and Lacy, L. L., "The Electrical Properties of Low-G Processed Immiscible Alloys," Third Space Processing Symposium: Skylab Results, Vol. II, June 1974, M-74-5, p. 137.

Papazian, J. M. and Larson, D. J., "Research on Metal Solidification in Zero-G State," NAS8-28604, Final Report, July 1975.

Parr, R. A. and Johnston, M. H., "Growth Parameters for Aligned Microstructures in Directionally Solidified Aluminum-Bismuth Monotectic," Met. Trans. 9A, 1825 (December 1978).

Passaglia, E., "The Metallurgy Experiments on ASTP," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114,

Pattee, H. E. and Monroe, R. E., "Materials Processing in Space M512 Skylab Samples - Skylab M552 Samples - Study Report," Battelle, NAS8-28725, July 1973.

Patten, J. W., "Materials Processing in Space," J. Vac. Sci. Technol. 14, 1289-1291 (November-December 1977).

Perepezko, J. H., "Solidification of Highly Undercooled Liquid Metals and Alloys," 17th Aerospace Sciences Meeting, New Orleans, LA, January 1979, AIAA Paper 79-0030.

Perepezko, J. H., "Solidification of Highly Undercooled Liquid Metals and Alloys," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142.

Perepezko, J. H., Galaup, C., and Cooper, K., "Solidification of Undercooled Monotectic Alloys," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Perepezko, J. H. and Galaup, C., "Undercooling of Bi-Ca Alloys," presented at TMS-AIME Annual Fall Meeting, Louisville, KY, October 12-13, 1981.

Pirich, R. G., "Characterization of Effects of Plane Front Solidification and Heat Treatment on Magnetic Properties of Bi/MnBi Composites," IEEE Trans. Mag. MAG-16, 1065 (September 1980).

Pirich, R. G., "Gravitationally Induced Convection During Directional Solidification of Off-Eutectic Mn-Bi Alloys," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Pirich, R. G., "The Effects of Convection During Directional Solidification of Eutectic Bi/MnBi," submitted to Journal of Crystal Growth, 1981.

Pirich, R. G., Larson, D. J., and Busch, G., "Ground-Based SPAR and STS Studies of Plane-Front Solidification, Heat Transfer and the Magnetic Properties of Bi/MnBi Composites," 18th Aerospace Sciences Meeting, Pasadena, CA, January 1980.

Pirich, R. G., Busch, G., and Larson, D. J., "The Bi-MnBi Eutectic Region of the Bi-Mn Phase Diagram," Met. Trans. 11A, 193 (January 1980).

Pirich, R. G., Larson, D. J., Jr., and Busch, G., "Magnetic and Metallurgical Properties of Directionally Solidified Eutectic Bi/MnBi Composites: The Effects of Near Zero Gravity and Annealing," 24th Annual Conference on Magnetism and Magnetic Materials, Paper 7D-3, November 17, 1978, Cleveland, OH.

Pirich, R. G., Larson, D. J., and Busch, G., "High Rate Direction Solidification of MnBi/Bi Magnetic Composites," Conference on In-Situ Composites-III, Paper FC2, November 1978, Boston, MA.

Pirich, R. G., Larson, D. J., and Busch, G., "Studies of Plane Front Solidification and Magnetic Properties of Bi/MnBi," AIAA Journal 19, 589 (1981).

Pollock, J. T. A. and Wald, F., "Directional Solidification of Multicomponent Superconducting Systems Under Zero-G Conditions," Space Processing and Manufacturing Meeting, October 1969, 11 pgs.

Pond, R. B., "Solidification of Pb-Sb Eutectic," SPAR I Final Report, NASA TM-X-3458, December 1976.

Poorman, R. M., "Skylab M551 Metals Melting Experiment," NASA TM-X-64960, May 1975, 26 pgs.

Potard, C., "Solidification of Hypermonotectic Al-In Alloys Under Microgravity," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Rathz, T. J., "The Application of Digital Techniques to the Analysis of Metallurgical Experiments," NASA TM-X-7337, February 1977, 47 pgs.

Rathz, T. J., "Superconducting Measurements of Nb-Ge Alloys Using Susceptibility Techniques," MS Thesis, University of Alabama in Huntsville, 1980.

Ravishankar, P. S., Wilcox, W. R., and Larspn, D. J., "The Microstructure of MnBi/Bi Eutectic Alloys," Acta Met. 28, 1583 (1980).

Raymond, L. and Ang, C. Y., "Casting Dispersion Strengthened Composites at Zero Gravity, Experiment 74-34," SPAR I Final Report, NASA TM-X-3458, August 1976.

Reger, J. L., "Experiment Development of Processes to Produce Homogenized Alloys of Immiscible Metals - Phase III," TRW, NAS8-27085, September 1972.

Reger, J. L., "Test and Evaluation of Apollo 14 Composite Casting Demonstration Specimens 6, 9, and 12, Phase I," TRW, NAS8-27085, September 1971, 90 pgs.

Reger, J. L., "Study on Processing Immiscible Materials in Zero Gravity," NAS8-28267, Final Report, 1975.

Reger, J. L., "M557 Immiscible Alloy Compositions," Third Space Processing Symposium: Skylab Results, M-74-5, Vol. I, June 1974, pp. 133-159.

Reger, J. L., Kirkpatrick, M. E., and Hammel, R. L., "Reduced Gravity Processing of Homogenized Immiscible Metal Alloys," Space Processing and Manufacturing in Space, October 1969, pp. 183-194.

Reger, J. L. and Yates, I. C., "Preparation and Metallurgical Properties of Low Gravity Processed Immiscible Materials," 12th Aerospace Sciences Meeting, Washington, D.C., AIAA Paper 74-207, January 1974, 11 pgs.

Robinson, M. B., "Radiative and Gas Cooling of Falling Molten Drops," NASA TM-78189, August 1978, 34 pgs.

Robinson, M. B., "Undercooling Measurement in a Low-Gravity Containerless Environment," MS Thesis, University of Alabama in Huntsville, 1981.

Schaefer, R. J. and Coriell, S. R., "Gravitationally-Induced Convection During Unidirectional Solidification," presented at TMS-AIME Annual Fall Meeting, Louisville, KY, October 12-13, 1981.

Schaefer, R. J. and Coriell, S. R., "Convective and Interfacial Instabilities During Solidification of Succinonitrile Containing Ethanol," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Schaefer, R. J. and Glicksman, M. E., "Quantitative Kinetic and Morphological Studies Using Model Systems," in Modeling of Casting and Welding Processes (ed. Harold D. Brody and Dirtan Apelian), The Metallurgical Society of AIME, New York, 1981.

Sekerka, R. F. and Coriell, S. R., "The Role of Convection on Solute Segregation During Alloy Solidification in Microgravity," presented at TMS-AIME Annual Fall Meeting, Louisville, KY, October 12-13, 1981.

Shahi, K. and Wagner, J. B., "Electrical Conductivity of Solid AgI Containing a Dispersion of Submicron Size Al_2O_3," Abstract No. 369, Electrochemical Society Meeting, Boston, MA, May 6-11, 1979.

Shahi, K. and Wagner, J. B., "Ionic Conductivity and Thermoelectric Power of Pure and Alumina-Dispersed AgI," Abstract No. 134, Electrochemical Society Meeting, Los Angeles, CA, October 14-19, 1979.

Sokolowski, R. S. and Glicksman, M. E., "Gravitational Influence of Eutectic Solidification," presented at TMS-AIME Annual Fall Meeting, Louisville, KY, October 12-13, 1981.

Steinberg, I., Lord, A. E., Lacy, L. L., and Johnson, J., "Production of Bulk Amorphous $Pd_{77.5}Si_{16.5}Cu_6$ in a Continuous Low-Gravity Environment," Appl. Phys. Lett. 38, 135-137 (February 1981).

Steurer, W. H. and Kaye, S., "Preparation and Evaluation of Apollo 14 Composite Experiments," NASA CR-61368, August 1971.

Steurer, W. H. and Kaye, S., "Space Processing of Composite Materials," GD, NAS8-29620, Final Report, 1975.

Steurer, W. H. and Wood, G. B., "Low-G Experiments for Metal Membranes - Final Report on the Preparation and Evaluation of Free-Fall Experiments," GD, NAS8-28056, March 1975, 23 pgs.

Takahashi, S., "Preparation of Silicon Whisker Reinforced Silver Composite Material in a Weightless Environment," 15th Aerospace Sciences Meeting, Los Angeles, CA, January 1977, AIAA Paper 77-195.

Takahashi, S., "Preparation of SiC Whisker-Reinforced Silver Composite Material on Skylab," AIAA Journal 16, 452-457 (May 1978).

Takahashi, S. and Kawada, T., "Preparation of Silicon Carbide Whisker Reinforced Silver Composite Material in a Weightless Environment - Skylab Experiment M561," Third Space Processing Symposium: Skylab Results, Huntsville, AL, June 1974, Vol. I, M-74-5, pp. 203-235.

Takahashi, S. and Sukuki, T., "Preparation of Whisker Reinforced Metal Composites and Their Properties," Comp. Mat. Struct. 2, 22-27 (1973).

Thompson, C. V. and Spaepen, F., "The Effect of Solute on the Homogeneous Crystal Nucleation Frequency in Metallic Melts," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Tobin, J. M. and Kossowsky, R., "Research Study on Materials Processing Experiment M512, Final Report on M551, M552, and M553," NAS8-28730, December 1972, 30 pgs.

Trahan, J. F. and Lacy, L. L., "Determination of Liquid Phase Immiscibility in the Lead-Zinc System," Mat. Sci. Engr. 33, 249-252 (1978).

Uhlmann, D. R., "Contact and Coalescence of Viscous Bodies, Experiment 74-53," SPAR III Final Report, NASA TM-78137, January 1978.

Uhlmann, D. R., Aubourg, P. A., and Joiner, B., "Multiphase Dispersions by Crystallization Processing," COSPAR XXI Plenary Meeting, Innsbruck, Austria, May 29-June 10, 1978.

Verhoeven, J. D., Noack, M. A. and Bevolo, A. J., "Suppression of Marangoni Convection with Oxide Films," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Webster, D., Crooks, D. D., and Vidoz, A. E., "The Effect of Oxide Dispersions on the Recrystallization of Beryllium," Met. Trans. 4, 2841 (December 1973).

Williams, J. R., "M52 Exothermic Brazing," Third Space Processing Symposium, M-74-5, Vol. I, June 1974, pp. 38-85.

Wouch, G., Frost, R. T., and Lord, A. E., "Preliminary Observations of Crystallization of Levitated Tungsten," J. Cryst. Growth 37, 181-183 (1977).

Wouch, G., Frost, R. T., Pinto, N. P., Keith, G. H., and Lord, A. E., "Uniform Distribution of BeO Particles in Be Casting Produced in Rocket Free Fall," Nature 274, (July 20, 1978).

Wouch, G., Gray, E. L., Frost, R. T., and Lord, A. E., "Estimation of Thermodynamic Properties from Solidification and Cooling Curves of Containerless Melts in the Terrestrial Environment and in Space," High Temp. Sci. 10, 241-259 (1978).

Wouch, G., Keith, G. H., et al., "Containerless Processing of Beryllium," SPAR II Final Report, NASA TM-78125, November 1978.

Wouch, G., Rutecki, D. J., Beser, N., and Okress, E., "Development of Containerless Process for Preparation of Tungsten with Improved Service Characteristics," NAS8-29879, March 1974.

Yates, I. C., "Apollo 14 Composite Casting Demonstration," Final Report, NASA CR-61369, August 20, 1971.

Yates, I. C., "Apollo 14 Composite Casting Demonstration," NASA TM-X-64641, October 1971, 78 pgs.

Yates, I. C. and Yost, V. H., "Research Rocket Tests RR-1 (Black Brant VC) and RR (Aerobee 170A): Investigation of the Stability of Bubbles in Plain and Fiber-Reinforced Metal Melted and Solidified in a Near-Zero-G Environment," NASA TM-X-64665, October 1972.

Yue, A. S., "M564 Metal and Halide Eutectics," Third Space Processing Symposium, Vol. I, M-74-5, June 1974, pp. 469- 491.

Yue, A. S., Allen, F. G., and Yu, J. G., "Zero Gravity Growth of NaF-NaCl Eutectics in the NASA Skylab Program," Final Report, NAS8-28310, January 1976, 65 pgs.

Yue, A. S., Crossman, F. W., Vidoz, A. E., and Jacobson, M. I., "Controlled Microstructure of Al-$CuAl_2$ Eutectic Composites and Their Compressive Properties," Trans. Met. Soc. of AIME 242, 2441-2451 (December 1968).

Yue, A. S. and Yu, J. G., "Solidification of NaCl-NaF Eutectic in Space," AIAA/ASME Thermophysics and Heat Transfer Conference, Boston, MA, July 15-17, 1974, AIAA Paper 74-646.

Yue, A. S. and Yu, J. G., "Halide Eutectic Growth," Third Space Processing Symposium: Skylab Results, Vol. I, June 1974, pp. 469-489.

Yue, A. S. and Yu, J. G., "Optical Properties of NaCl-NaF Eutectics," Proceedings of Conference on In-Situ Composites, Bolton Landing, NY, September 2-5, 1975, pp. 425-431.

Yue, A. S., Yue, B. K., and Lee, J. Y. M., "Halide Eutectic Growth in Apollo-Soyuz Test Project," Final Report, UCLA, October 1975.

Abdalla, K. L., Otto, E. W., Symons, E. P., and Petrash, D. A., "Liquid Transfer Demonstration on Board Apollo 14 During Trans-earth Orbit," NASA TM-X-2410 November 1971, 31 pgs.

Allen, R. E., Barlow, G. H., et al., "Electrophoresis Technology Experiment MA-011," Apollo-Soyuz Test Project Summary Science Report, Vol. I, 1977, pp. 307-334.

Allen, R. E., Rhodes, P. H., et al., "Column Electrophoresis on the Apollo-Soyuz Test Project," Sep. & Purif. Meth. 6, 1-59 (1977).

Annamalai, P., Subramanian, R. S., et al., "Rotation as a Centering Mechanism of Microballoon Fusion Targets," Topical Meeting of Inertial Confinement Fusion, Optical Society of America, San Diego, CA, February 1980.

Annamalai, P. S., Subramanian, R. S., and Cole, R., "Bubble Migration in a Rotating Liquid-Filled Sphere," submitted to Physics of Fluids, 1981.

Annamalai, P., Subramanian, R., and Cole, R., "Bubble Motion in a Rotating Liquid Body," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Bannister, T. C., "Heat Flow and Convection Demonstration (Apollo 14)," NASA TM-X-64735, March 1973, 139 pgs.

Bannister, T. C. and Bourgeois, S. V., "Liquid Drop Behavior in Weightlessness from Skylab," International Colloquium on Drops and Bubbles, CIT, Pasadena, CA, August 28-30, 1974, pp. 629-631.

Bannister, T. C., Grodzka, P. G., Spradley, L. W., Hedden, R. O., Bourgeois, S. V., and Facemire, B. R., "Apollo 17 Heat Flow and Convection Experiments: Final Results of Data Analysis," NASA TM-X-64772, July 1973.

Bannister, T. C., Grodzka, P. G., "Heat Flow and Convection Demonstration Experiments Aboard Apollo 14 and Apollo 17," 24th IAF Congress, Baku, USSR, October 1973.

Barlow, G. H., "Apollo-Soyuz Electrophoresis Technology Experiment - Electrophoresis Separation of Kidney Cells at Zero Gravity," Abbott Labs, NAS8-30591, Final Report, July 1976, 29 pgs.

Bartels, P. A., Bier, M., Baker, L. R., and Blenman, C., "Design Development, Test, and Evaluation of an Automated Analytical Electrophoresis Apparatus," University of Arizona, NAS8-31948, Final Report, December 1978.

Bartels, P. H., Bartels, H. G., et al., "Automated Analytical Electrophoresis Microscope," accepted for publication in Cell Biophysics, 1981.

Bartels, P. H. and Bartels, H. G., "Statistical Evaluation of Electrophoresis Mobility Measurements in the AEMS," presented at Third International Conference on Electrophoresis, Charleston, SC, April 7-10, 1981.

Benedikt, E. T., Halliburton, R., et al., "Propellant Behavior in Zero Gravity," Final Report, NASA CR-62508, November 1964, 63 pgs.

Benefield, J. W., "Heat Flow and Convection Demonstration, NASA" CR-11948, August 197..

Bier, M., "The Role of Gravity in Preparative Electrophoresis," University of Arizona, NAS8-28966, Final Report, January 1978, 44 pgs.

Bier, M., "Bioprocessing: Prospects for Space Electrophoresis," 1976 NASA Colloquium on Bioprocessing in Space, Houston, TX, March 1976, NASA TM-X-58191.

Bier, M., "Electrophoresis: Materials Sciences in Space with Application to Space Processing," Progress in Astronautics and Aeronautics, Vol. 52, 1977, p. 41.

Bier, M., "Reassessment of Space Electrophoresis," 20th COSPAR Plenary Meeting, Tel Aviv, Israel, June 1977.

Bier, M., "Potential Contribution of the Space Program to the Advancement of Electrophoresis and its Biomedical Applications," VA Hospital, Tucson, AZ, Paper submitted to the Subcommittee on Space Science and Applications, U.S. House of Representatives, July 14, 1975, 17 pgs.

Bier, M., "Space Bioprocessing - Status and Potentials," VA Hospital, Tucson, AZ, Paper submitted for consideration of Committee on Science and Technology, U.S. House of Representatives, January 10, 1978, 13 pgs.

Bier, M., "Preparative Isotachophoresis," in Proceedings of the International Workshop on Technology for Protein Separation and Improvement of Blood Plasma Fractionation, DHEW Publication No. (NIH)78-1422, 1977.

Bier, M., "Continuous Flow Electrophoresis," in Proceedings of the International Workshop on Technology for Protein Separation and Improvement of Blood Plasma Fractionation, DHEW Publication No. (NIH)78-1422, 1977.

Bier, M., "Large Scale Recycling Isoelectric Focusing," in Electrofocus/78 (Hagland, Westerfield and Ball, Eds.), Elsevier/North Holland, New York, 1979.

Bier, M. and Lindberg, R. E., "Space Electrophoresis - Status and Potentials," AIAA 16th Aerospace Sciences Meeting, Huntsville, AL, January 1978, AIAA Paper 78-224.

Bier, M., Egen, N. B., Allyger, T. T., Twitty, G. E., and Mosher, R. A., "New Developments in Isoelectric Focusing," in Peptides (E. Gross and Meienhofer, Eds.), Pierce Chemical Co., Rockford, Ill., 1979.

Bier, M. and Allgyer, T. T., "Isotachophoresis," in Electrokinetic Separation Methods, (eds. P. G. Righetti, et al.), Elsevier/North Holland Biomedical Press, 1979.

Bier, M. and Kopwillem, A., "Plasma Protein Fractionation in Sephadex by Isotachophoresis Using Discrete Spacers," in Electrofocusing and Isotachophoresis, Walter de Gruyter & Co., New York, 1977.

Bier, M., Cuddeback, R. M., and Kopwillem, A., "Preparative Plasma Protein Fractionation by Isotachophoresis in Sephadex Columns," J. Chromato. 132, 437-450 (1977).

Bier, M., Hinckley, O. N., Smolka, A. J. K., and Snyder, R. S., "Potential Use of Isotachophoresis in Space," 22nd Coloquium on Protides of the Biological Fluids, (ed. H. Peeters), Pergamon Press, Oxford, 1975.

Bier, M., Hinckley, O. N., et al., "Role of Gravity in Preparative Electrophoresis," Third Space Processing Symposium, Vol. II, M-74-5, June 1974, pp. 729-755.

Bier, M., Smolka, A. J. K., Kopwillem, A., and Ostrach, S., "Preparative Electrophoresis in Zero Gravity," J. Colloid & Interface Solids 55, 197-207 (April 1976).

Bier, M. and Snyder, R. S., "Electrophoresis in Space at Zero Gravity," 12th Aerospace Sciences Meeting, Washington, D.C., February 1974, AIAA Paper 74-210.

Boltz, R. C., Miller, T. Y., Todd, P., and Kuklinsky, N. E., "Citrate Buffer System for Isoelectric Focusing and Electrophoresis of Living Mammalian Cells," in Electrophoresis 1978, Elsevier/North Holland Press, 1978, pp. 345-355.

Boltz, R. C. and Todd, P., "Density Gradient Electrophoresis of Cells in a Vertical Column," in Electrokinetic Separation Methods, Elsevier/North Holland Biomedical Press, 1979.

Boltz, R. C., Todd, P., Hammerstedt, R. H., Hymer, W. C., Docherty, J., and Thompson, C. J., "Initial Studies on the Separation Cells by Density Gradient Isoelectric Focusing," Cell Separation Methods, Elsevier/North Holland Biomedical Press, 1977.

Bourgeois, S. V., "Physical Forces Influencing Skylab Experiments M551, M552, and M553," NASA CR-129037, January 1974, 76 pgs.

Bourgeois, S. V., "Liquid Spreading-ASTP Science Demonstration, AIAA 16th Aerospace Sciences Meeting, Huntsville, AL, January 16-18 1975, AIAA Paper 78-283.

Bourgeois, S. V., "Convection in Skylab M512 Experiments: M551, M552, and M553," Phase B Report, NASA CR-12439, July 1973, 75 pgs.

Bourgeois, S. V., "Buoyant and Capillary Natural Convection in Infinite Horizontal Liquid Layers Heated Laterally," Lett. Heat & Mass Transfer 2, 223-236 (1975).

Bourgeois, S. V. and Brashears, M. R., "Fluid Dynamics and Kinematics of Molten Metals in the Low Gravity Environment of Skylab," AIAA 12th Aerospace Sciences Meeting, Washington, D.C., January 30-February 1, 1974, AIAA Paper 75-205.

Bourgeois, S. V., Grodzka, P. G., Pond, J. E., and Spradley, L., "Analytical Support for SPAR Experiment 76-36," Final Report, NAS8-32401, August 1977.

Brooks, D. E., "Countercurrent Distribution of Biological Cells," Final Report, NAS8-32817, January 1978.

Brooks, D. E., "Definition of Performance Specifications for Automated Analytical Electrophoresis Facility (AAEP)," Final Report, NAS8-31386, February 1976.

Brooks, D. E., "SPAR Project: Countercurrent Distribution of Biologicals," Final Report, NAS8-32353, 1977.

Brooks, D. E., "Studies on Aqueous Two Phase Polymer Systems Useful for Partitioning of Biological Materials," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Brooks, D. E., Seaman, G. V. F., Olson, G. B., and Bartels, P. H., "Design and Testing of a Computer Controlled Automated Electrophoresis Microscope System (AEMS)," in Cell Electrophoresis Clinical Application and Methodology INSERM Symposium No. 11 (A. W. Freece and D. Sabolovic, eds.), Elsevier/North-Holland Biomedical Press, 1979, pp. 409-419.

Brooks, D. E., Sorenson, P., et al., "Detection of a Lipid Phase Transition by Partitioning of Liposomes," Second International Conference on Partitioning, Sheffield, England, April 1981.

Brown, R. K., "Electrophoresis Separation of Proteins in Space," NAS8-29823, Final Report.

Carruthers, J. R., "Studies of Liquid Floating Zones on SL-IV, The Third Skylab Mission," Third Space Processing Symposium: Skylab Results, NASA M-74-5, June 1974, pp. 837-856.

Carruthers, J. R., Gibson, E. G., Klett, M. G., and Facemire, B., "Studies of Rotating Liquid Floating Zones on Skylab IV," 10th Thermophysics Conference, Denver, CO, AIAA Paper 75-692.

Carruthers, J. R. and Grasso, M., "Studies of Floating Liquid Zones in Simulated Zero Gravity," J. Appl. Phys. 43, 436-445 (1972).

Chun, C. H., "Experiments on Steady and Oscillatory Temperature Distribution in a Floating Zone Due to Marangoni Convection," Acta Astron. 7, 479-4888 (1980).

Cole, R., Papazian, J. M., and Wilcox, W. R., "Bubble Departute Radii at Solidification Interfaces," Int. J. Heat & Mass Transfer 23, 219-224 (1980).

Coriell, S.R., Hardy, S.C., and Cordes, M.R., "Stability of Liquid Zones", J. Colloid & Interface Sci. 60, 126-136 (June 1977).

Dintenfass, L., "Aggregation of Red Cells and Blood Viscosity Under Near Zero-Gravity," Biorheology 16, 29-36 (1979).

Dintenfass, L., "The Clinical Impact of the Newer Research in Blood Rheology," Angiology 32, 217-229 (1981).

Dintenfass, L., "Aggregation of Red Cells and Blood Viscosity Under Zero and One Gravities-Instrumentation for Spacelab 3," Aust. Phys. Sci. Med. 2-8, 437-451 (November/December 1979).

Dintenfass, L., "Haemorheology of Capillary Perfusion," in Capillary Perfusion, Chapter IV, R. M. Hardaway, ed., 1980.

Dintenfass, L., "Kinetics and Morphology of Red Cells: Preparations for the NASA Spacelab," in Rheology, Volume 3: Applications, Plenum Press, New York, 1980, pp. 503-508.

Dintenfass, L., "Haemorheology and the Microcirculation Role of the Inversion Phenomenon," in Progress in Microcirculation Research, D. Garlick, ed., 1980, pp. 100-140.

Dintenfass, L., "Clinical Applications of Haemorheology," in The Rheology of Blood, Blood Vessels, and Associated Tissues," (eds., D. R. Gross and N. H. C. Hwang), Sijthoff & Noordhoff, Holland, 1981, pp. 22-50.

Dintenfass, L., Jedrzejczyk, H., and Willard, A., "Application of Sterological Methods to Evaluation of Aggregation of Red Cells in 12.5 m Slit: A Photographic and Statistical Study," Biorheology 18, 387-404 (1981).

Dintenfass, L. and Willard, A., "Analysis of Results and Evaluation of Size of Aggregates Kinetics and Morphology of Aggregation of Red Blood Cells: Preparation for NASA Experiment. Part I.," Aust. Phys. Engr. Sci. in Med. 4, 140-152 (1981).

Dintenfass, L. and Seaman, G. V. F., "Blood Viscosity in Outer Space - A Project for the NASA Space Shuttle," in Blood Viscosity in Heart Disease and Cancer, New York, Pergamon Press, 1981.

Dodge, F. T., et al., "Thermodynamics and Heat Transfer Experiments in Space," Southwest Research Institute, NASA CR-13472, 1975.

Dressler, R. F., "Transient Thermal Convection During Orbital Spaceflight," J. Cryst. Growth 54, 523-533 (September 1981).

Dressler, R. F., Robertson, S. J., and Spradley, L. W., "Natural Convection with Gravity-Shift in Circular Cylinders in Low Gravity," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Edwards, D. K., "Rotation-Induced, Free-Convection Heat Transfer in a Zero Gravity Field," AIAA Journal 5, 333-334 (February 1967).

Egen, N. B., Twitty, G. E., and Bier, M., "Recycling Isoelectric Focusing with Computer Controlled Data Acquisition System," 17th Aerospace Sciences Meeting, New Orleans, LA, January 15-17, 1979, AIAA Paper 79-0405.

El-Kaddah, N. and Szekely, J., "A Mathematical Representation of the Electromagnetic Force Field, The Fluid Flow Field and the Temperature Profile in Levitated Metal Droplets," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Falb, R. D., Hughes, K. E., and Powell, T. R., "Sample Detection and Analysis Techniques for Electrophoretic Separation," Battelle, NAS8-29629, Final Report, June 1975.

Fan, C., "Convection Phenomena in Electrophoresis Separation," Lockheed, NASA CR-124058, December 1972.

Foster, D. A., Eberhardt, R. N., and Tegart, J. R., "Behavior of Fluids in a Weightless Environment," 1976 NASA Colloquium on Bioprocessing in Space, Houston, TX, March 10-12, 1976, NASA TM-X-58191.

Fine, J. and Hardy, S. C., "The Generation of Clean Liquid Gallium Surfaces," Proceedings of the Symposium on the Physics of Ionized Gases, Dubrovnik, Yugoslavia, August 1980.

Fine, J. and Hardy, S. C., "Ion Bombardment Cleaning of Liquid Gallium Surfaces," J. Vac. Sci. Techn. 18, 1310-1311 (1981).

Fowle, A. A., "Float-Zone Experiments System (FZES) for Spacelab," 17th Aerospace Sciences Meeting, New Orleans, LA, January 1979, AIAA Paper 79-0371.

Fowle, A. A., Haggerty, J. S., Perron, R. R., Strong, P. F., and Swanson, J. L., "Float-Zone Processing in a Weightless Environment," NASA CR-2768, November 1976, 82 pgs.

Fowle, A. A., Wang, C. A., and Strong, P. F., "Experiments on the Stability of Conical and Cylindrical Liquid Columns at Low Bond Numbers," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142.

Giannovario, J. A. and Griffin, R. N., "Simulated Null Gravity Environment as Applied to Electrophoretic Separation of Biological Species," 16th Aerospace Sciences Meeting, Huntsville, AL, January 1978, AIAA Paper 78-1613.

Giannovario, J. A., Griffin, R. N., and Gray, E. L., "A Mathematical Model of Free Flow Electrophoresis," J. Chromat. 153, 329-352 (1978).

Gibson, E. G., "Skylab Fluid Mechanics Demonstrations," International Colloquium on Drops and Bubbles, CIT, Pasadena, CA, August 28-30, 1974, pp. 158-160.

Grevet, J., Szekely, J., and El-Kaddah, N., "An Experimental and Analytical Study of Bas Bubble Driven Circulation Systems," submitted to International Journal of Heat & Mass Transfer, 1981.

Griffin, R. N. and McCreight, L. R., "Convectionless Electrophoretic Separation of Biological Preparations," NASA CR-12392, June 1972.

Grodzka, P. G., Types of Natural Convection in Space Manufacturing Processes," NASA CR-124184, January 1973.

Grodzka, P. G. and Facemire, B. R., "Three Model Space Experiments on Chemical Reactions," 1976 NASA Colloquium on Bioprocessing in Space, Houston, TX, March 10-12, 1976, NASA TM-X-58191.

Grodzka, P. G. and Bourgeois, S. V., "Fluid and Particle Dynamic Effects in Low-G Composite Casting," NASA CR-124216, January 1973, 46 pgs.

Grodzka, P. G., Bourgeois, S. V., Brashears, M. R., and Spradley, L. W., "Fluid Motion in a Low-G Environment," Third Space Processing Symposium: Skylab Results, Vol. I, June 1974, M-75-4, pp. 691-729.

Grodzka, P. G., Johnston, M. H., and Griner, C. S., "Convection Analysis of the Dendrite Remelting Rocket Experiment," AIAA Journal 16, 417-418 (May 1978).

Grodzka, P. G., Fan, C., and Hedden, R. O., "The Apollo 14 Heat Flow and Convection Demonstration Experiments: Final Results of Data Analyses," Lockheed, NAS8-25577, September 1971.

Grodzka, P. G. and Bannister, T. C., "Heat Flow and Convection Demonstration Experiments Aboard Apollo 14," Science 176, 506-508 (May 1972).

Grodzka, P. G. and Bannister, T. C., Heat Flow and Convection Experiments Aboard Apollo 17," Science 187, 165-167 (1975).

Grodzka, P. G. and Bannister, T. C., "Natural Convection in Low-G Environments," 12th Aerospace Sciences Meeting, Washington, D.C., January 1974, AIAA Paper 74-156.

Grodzka, P. G., Pond, J. E., and Spradley, L. W., "Thermal and Convection Analyses of the Dendrite Remelting Rocket Experiment 74-21 in the Space Processing Rocket Program," Final Report, NAS8-31800, May 1976.

Guili, R. T., "Summary of Scientific Results," Apollo-Soyuz Test Project Summary Science Report, Vol. I, 1977, pp. 1-21.

Hardy, S. C. and Fine, J., "Studies of Liquid Metal Surfaces Using Auger Spectroscopy," to be published in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Heimbuch, A. H. and Parker, J. A., "Low-Gravity Synthesis of Polymers with Controlled Molecular Configuration," 10th Aerospace Sciences Meeting, Denver, CO, May 1975, AIAA Paper 75-697.

Hendricks, J. and Askins, B., "Fluids Experiment System Workshop," University of Alabama in Huntsville, July 11-12, 1979.

Hudson, V., Mitchell, R. C., Stark, J. A., and White, R. C., "Study of Zero-Gravity, Vapor/Liquid Separators," NASA CR-71624, January 1966, 146 pgs.

Hymer, W. C., Wilbur, D. L., et al., "Pituitary Hollow Fiber Units in Vivo and In Vitro," Neuroendocrinology 32, 339-349 (1981).

Hymer, W. C., Wilbur, D. L., et al., "The Human Post Mortem Pituitary Contains Functional Somatotrophs," 62nd Meeting of Endocrine Society, Washington, D.C., 1980.

Hymer, W. C., Harkness, J., et al., "Pituitary Hollow Fiber Units and the Dwarf Mouse," Neuroendocrinology 32, 350-354 (1981).

Hymer, W. C. and Harkness, D. L., "Pituitary Cell Systems In Vitro and In Vivo," in Functional Correlates of Hormone Receptors, 13-44 (1980).

Hymer, W. C. and Todd, P., "Purification of Rat Pituitary Somatotrophs by Density Gradient Electrophoresis," submitted to Cell Biophysics, 1981.

Jacobi, N., Tagg, R. P., and Kendall, J. M., "Free Oscillations of a Large Drop in Space," 17th Aerospace Sciences Meeting, New Orleans, LA, January 1979, AIAA Paper 79-0225.

Jayaraj, K., Cole, R., and Subramanian, R. S., "Combined Thermocapillary and Buoyant Flow in a Drop in a Space Laboratory," Journal of Colloid and Interface Science, in press.

Johnson, K., "Radiative and Free Convective Heat Transfer From A Containerless Sphere," NASA TM-78249, September 1979.

Kamotani, Y., Lowry, S., and Ostrach, S., "An Experimental Study of Heat Induced Surface Tension Driven Flow," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Kelsey, R., Hymer, W. C., and Page, R., "Pituitary Cell Transplants to the Cerebral Ventricles Suppress Host Pituitary Cell Function," Neuroendocrinology 33, 312-316 (1981).

Kendall, J. M., "Fluid Dynamics Relating to the Production of Large Fusion Targets," Technical Digest of the Conference on Inertial Confinement Fusion, San Diego, CA, February 1980.

Kessler, J. O. and Bier, M., "Gravitational Dynamics of Biosystems: Some Speculations," COSPAR Symposium on Material Sciences in Space, Philadelphia, PA, 1976, Paper D.3.7, p. 125.

Kimzey, J. H., "Skylab Experiment M479 - Zero Gravity Flammibility," Third Space Processing Symposium: Skylab Results, Vol. 1, June 1974, M-74-5.

Kleiner, H. and Schram, E., "Separation of Isozymes Hydrolyzing L-Leucyl-Beta-Napthylamide by Vertical Electrophoresis in Acrylamide Gel," NASA TT-F-10724, February 1967.

Klett, M. G. and Bourgeois, S. V., "Analysis of Skylab IV Fluid Mechanic Science Demonstration III A(35).45," 10th Thermophysics Conference, Denver, CO, May 25-27, 1975, AIAA Paper 75-693.

Knoll, R. H., Nunamaker, R. R., and Smolak, G. R., "Weightlessness Experiments with Liquid Hydrogen in Aerobee Sounding Rockets Uniform Radiant Heat Addition - Flight 1," NASA TM-X-484, June 1962, 63 pgs.

Knox, R. J., "Electrophoretic Characterization of Aldehyde Fixed Red Blood Cells, Kidney Cells, Lymphocytes, and Chamber Coatings, NASA CR-2755, October 1976.

Kopwillen, A., Merriman, W. G., Bier, M., Cuddeback, R. M., and Smolka, A. J. K., "Serum Protein Fractionation by Isotachophoresis Using Amino Acid Spacers," J. Chromato. 118, 35-46 (1976).

Kornfeld, D. M., "Large-Size Monodisperse Latexes as a Commercial Space Product," NASA TM-78132, August 1977.

Kowalczyk, J., Krajewski, R., and Pompowski, I., "Electromagnetophoresis of Electrically-Charged Particles," NASA TT-F-9504, August 1965.

Kwon, O'D., Beaglehole, D., Webb, W. W., Widom, B., Cahn, J. W., Schmidt, J. W., Moldover, M. R., and Stephenson, B., "Thickness of the Liquid-Vapor Wetting Layer," Phys. Rev. Lett. 48, 185-188 (January 18, 1982).

Lacy, L. L. and Otto, G. H., "The Behavior of Immiscible Liquids in Space," AIAA/ASME 1974 Thermophysics and Heat Transfer Conference, Boston, MA, July 1974, AIAA Paper 74-668.

Lacy, L. L. and Otto, G. H., "The Stability of Liquid Dispersions in Low Gravity," AIAA/AGU Conference on Scientific Experiments of Skylab, Huntsville, AL, November 1974, AIAA Paper 74-1242.

Lacy, L. L., Nishioka, G., and Ross, S., "Investigations on Transparent Liquid-Miscibility Gap Systems," Proceedings of Spacelab Fluids Experiment System Workshop, July 1979, UAH, Huntsville, AL.

Lewis, M. L., Morrison, D. R., Mieszkuc, B. J., and Fessler, D. L., "Problems in Bioassay of Products from Cultured Cells: Plasminogen Activator," to be published in Proceedings of Second International Cell Culture Congress (ed. R. Acton), University of Alabama at Birmingham, September 29, 1981.

Li, C. H., "Jetting Action Due to Differential Evaporation in Space Manufacturing," AIAA/ASME 1974 Thermophysics and Heat Transfer Conference, Boston, MA, July 1974, 14 pgs.

Lowry, S., "An Experimental Study of Heat Induced Surface-Tension-Driven Flow," MS Thesis, Case Western Reserve University, 1980.

Margel, S. and Rembaum, A., "Synthesis and Characterization of Polyglutaraldehyde," Macromolecules 13, 19 (1980).

McCreight, L. R., "Electrophoretic Separator for Purifying Biologicals," GE, NAS8-31036, Final Report, May 1978.

McCreight, L. R., "Electrophoresis for Biological Production," 1976 NASA Colloquium on Bioprocessing in Space, Houston, TX, March 10-12, 1976, NASA TM-X58191.

McCreight, L. R., Griffin, R. N., Locker, R. J., and Giannovario, J. A., "Continuous Flow Electrophoresis Separator for Biologicals," AIAA 15th Aerospace Sciences Meeting, Los Angeles, CA, January 1977, AIAA Paper 77-234.

McCreight, L. R., Griffin, R. N., Locker, R. J., and Giannovario, J. A., "Continuous Flow Electrophoresis Separator for Biologicals," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 175-179.

McCreight, L. R. and Griffin, R. N., "Unit Separation Processes in Space," Space Processing and Manufacturing in Space, October 1969, pp. 216-238.

McGuire, J. K., Miller, T. Y., Tipps, R. W., Snyder, R. S., and Righetti, P. G., "New Experimental Approaches to the Isoelectric Fractionation of Cells," J. Chromat. 194, 323-333 (1980).

McGuire, J. K. and Snyder, R. S., "Operational Parameters for Continuous Flow Electrophoresis of Cells," in Electrophoresis '81, Walter De Gruyter & Co., Berlin, 1981, pp. 947-960.

McKannan, E. C., Krupnick, A. C., Griffin, R. N., and McCreight, L. R., "Electrophoresis Separation in Space - Apollo 14," NASA TM-X-64611, August 1971, 22 pgs.

McNeil, T. J., Cole, R., et al., "Thermocapillary Convection in a Cylindrical Zone," presented at International Chemical Engineering Congress, Montreal, Canada, October 1981.

Martin, R. R., Warr, G. A., Putman, M. J., Kenton, D. H., and Holleman, C. L., "Polymorphonuclear Leukocyte Response, Experiment MA-032," Apollo-Soyuz Test Project Summary Science Report, 1977, pp. 263-279.

Maurer, A. C., "Innovations in the Therapy of Diabetes," Am. Scientist, (April 1979).

Mayeux, J. V., "Influence of Zero-G on Single-Cell Systems and Zero-G Fermenter Design Concepts," 1976 NASA Colloquium on Bioprocessing in Space, Houston, TX, March 1976, NASA TM-X-58191.

Meyyappan, M., Wilcox, W. R., and Subramanian, R. S., "Thermocapillary Migration of a Bubble Normal to a Plane Surface," J. Colloid & Interface Sci. 83, 199-208 (1981).

Mosher, R. A., Palusinski, O. A., and Bier, M., "Computer Simulation and Experimental Validation of Isoelectric Focusing in Ampholine-Free Systems," submitted to Journal of Chromatography, 1981.

Muraki, T. and Masubuchi, K., "Thermal Analysis of M551 Experiment for Materials Processing in Space," NAS8-28732, Final Report.

Muraki, T. and Masubuchi, K., "Thermal Analysis of M552 Experiment for Materials Processing in Space," NASA CR-129043, October 1974, 46 pgs.

Nordt, F. J., Knox, R. J., and Seaman, G. V. F., "Elimination of Electroosmotic Flow in Analytical Particle Electrophoresis," in Hydrogels for Medical and Related Applications, 1976, pp. 225-240.

Nyiri, L. K., "Some Questions of Space Bioengineering," 1976 NASA Colloquium on Bioprocessing in Space, Houston, TX, March 10-12, 1976, NASA TM-X-58191.

Oker, E. and Merte, H., "Transient Boiling Heat Transfer in Saturated Liquid Nitrogen and Fl13 at Standard and Zero Gravity," NASA CR-120202, October 1973.

Olson, G. B., McFarland, M., and Bartels, P. H., "Application of the Automated Electrophoresis Microscope System to Various Biological Tests," in Electrophoresis '81, Walter De Gruyter & Co., Berlin, 1981, pp. 933-946.

Olson, G. B., Bartels, P. H., Brooks, D. E., Bartels, H. G., and Seaman, G. V. F., "Computer-controlled Electrophoresis Microscope," SPIE 232, 54-61 (1980).

Omenyi, S. N., Snyder, R. S., Van Oss, C. J., Absolom, D. R., and Neumann, A. W., "Reduction of Droplet Formation and Sedimentation of Fixed Erythrocytes in Stationary and Flowing Systems," in Electrophoresis '81, Walter De Gruyter & Co., Berlin, 1981, pp. 961-970.

Omenyi, S. N., Snyder, R. S., and Van Oss, C. J., "Stability of Layered Erythrocyte Suspensions at Unit Gravity," J. Colloid & Interface Sci. 81, 402-409 (June 1981).

Ostrach, S., "Convection Due to Surface Tension Gradients," XXI COSPAR Plenary Meeting, Innsbruck, Austria, May 1978.

Ostrach, S., "Convection Phenomena at Reduced Gravity of Importance for Materials Processing," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 41-62.

Ostrach, S., "Convection in Continuous-Flow Electrophoresis," J. Chromato. 140, 187-195 (1977).

Ostrach, S., "Convection Phenomena of Importance for Materials Processing in Space," XIX COSPAR Plenary Meeting, Philadelphia, PA, 1976, Paper 0.3.1.

Ostrach, S., "Convection Phenomena at Reduced Gravity of Importance for Materials Processing," Case Western Reserve University, NAS8-31802, Final Report, April 1977, 20 pgs.

Ostrach, S., "Convection in Continuous-Flow Electrophoresis," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 142-147

Ostrach, S., "Skylab Science Demonstrations," Proceedings of Symposium on Space Processing and Manufacturing, Frascati, Italy, March 1974, ESRO SP-101.

Ostrach, S. and Pnueli, D., "The Thermal Instability of Completely Confined Fluids Inside Some Particular Configurations," Trans. of ASME, 346-354 (November 1963).

Ostrach, S. and Pradham, A., "Surface-Tension Induced Convection at Reduced Gravity," AIAA Journal 16, 419-424 (May 1978).

Otto, E. W., "Static and Dynamic Behavior of the LiquidVapor Interface During Weightlessness," AICE 55th Symposium, Houston, TX, February 1965, 39 pgs.

Owen, R. B., "Optical Measurements and Tests Performed in Low-Gravity Environment," SPIE 255, 74-81 (1980).

Owen, R. B., "Gas-Laser Behavior in a Low-Gravity Environment," Opt. Lett. 6, 331-333 (July 1981).

Owen, R. B., "Optical Measurements and Tests Performed in a Low-Gravity Environment," Opt. Engr. 20, 634-638 (July/August 1981).

Owen, R. B., "Interferometry and Holography in a Low Gravity Environment," submitted to Applied Optics, October 1981.

Owen, R. B. and Johnston, M. H., "Laser Shadowgraph and Schlieren Studies of Gravity-Related Flow During Solidification," Opt. Lasers in Engr. 2, 129-146 (1981).

Palsuinski, O. A., Allyger, T. T., et al., "Mathematical Modeling and Computer Simulation of Isoelectric Focusing with Electrochemically Defined Ampholytes," Biophys. Chem. 13, 193-202 (1981).

Papazian, J. M., "The Interaction of Bubbles with Solidification Interfaces," 15th Aerospace Sciences Meeting, Los Angeles, CA, January 1977, AIAA Paper 77-194.

Papazian, J. M. and Wilcox, W. R., "Thermal Migration of Bubbles and Their Interaction with Solidification Interface," SPAR I Final Report, NASA TM-X-3458, December 1976.

Papazian, J. M. and Wilcox, W. R., "Bubble Behavior During Solidification in Low-G," NAS8-31529, Final Report, February 1979.

Papazian, J. M. and Wilcox, W. R., "Interaction of Bubbles with Solidification Interfaces," SPAR II Final Report, NASA TM-X-78137, January 1978.

Pimputkar, S. M. and Ostrach, S., "Transient Thermocapillary Flow in Thin Liquid Layers," Phys. of Fluids 23 (July 1980).

Platt, G. K., "Space Vehicle Low Gravity Fluid Mechanics Problems and the Feasibility of Their Experimental Investigation," NASA TM-X-53589, October 3, 1967.

Pogson, J. T. and Anderson, D. M., "Space Processing Float Zone Thermal Analysis," NAS8-31635, Final Report, May 1976, 20 pgs.

Reed, R. E., Uelhoff, W., and Adair, H. L., "Surface-Tension Induced Convection, Experiment MA-041," Apollo-Soyuz Test Project Summary Science Report, Vol. I, NASA SP-412, 1977, pp. 369-401.

Rembaum, A., "Microspheres as Immunoreagents for Cell Identification," in Flow Cytometry and Sorting (Melamed, Mullaney and Mendelsohn, eds.), John Wiley, 1979.

Rembaum, A., et al., "Polyglutaraldehyde: A New Reagent for Coupling Proteins to Microspheres and for Labeling Cell-Surface Receptions," J. Immuno. Methods 24, 239-250 (1978).

Rembaum, A., Yen, S.P.S., Margel, S., and Levy, J., "Synthesis and Reactions of Hydrophilic Functional Microspheres for Immunological Studies", J. Immuno. Methods 24, 239-250 (1978).

Rembaum, A., Yen, S.P.S., et al., "Synthesis and Reactions of Hydrophilic Functional Microspheres for Immunological Studies", J. Macrom. Sci. Chem. A 13, 603-632 (1979).

Rembaum, A. and Margel, S., "Design of Polymeric Immunomicrospheres for Cell Labeling and Cell Separation," Brit. Polymer J., 10, 275-280 (December 1978).

Rembaum, A., Yen, S. P. S., Cheong, E., Wallace, S., Molday, R. S., Gordon, I. L., and Dreyer, W. J., "Functional Polymeric Microspheres Based on 2-Hydroxyeethyl Methacrylate for Immunochemical Studies," Macromolecules 9, 328-336 (March/April 1976).

Rembaum, A. and Dreyer, W. J., "Immunomicrospheres: Polymeric Reagents for Cell Labeling and Separation," Science 208, 363 (1980).

Reynolds, W. C. and Saterlee, H. M., "Liquid Propellant Behavior at Low and Zero-G," in The Dynamic Behavior of Liquids in Moving Containers with Applications to Space Vehicle Technology, NASA SP-106, 1966.

Rhodes, P. H., "High Resolution, Continuous-Flow Electrophoresis in Microgravity," NASA TM-78158, February 1978.

Rhodes, P. H., "Sample Stream Distortion Modeled in Continuous-Flow Electrophoresis," NASA TM-X-78178, August 1979, 45 pgs.

Rhodes, P. H., "High Resolution Continuous-Flow Electrophoresis in the Reduced Gravity Environment," in Electrophoresis '81, Walter De Gruyter & Co., Berlin, 1981, pp. 919-932.

Rhodes, P. H. and Snyder, R. S., "The Effect of Axial Gradients on the Fluid Flow in an Electrophoresis-Type Separation Chamber," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Rhodes, P. H. and Snyder, R. S., "Numerical Analysis of Continuous Flow Electrophoresis," in Electrophoresis '81, walter De Gruyter & Co., Berlin, 1981, pp. 899-917.

Rhodes, P. H., Miller, T. Y., and Snyder, R. S., "Design Considerations of a Thermally Stabilized Continuous Flow Electrophoresis Chamber," Electrophoresis '81, Walter De Gruyter & Co., Berlin, 1981, pp. 971-981.

Robertson, S. J. and Spradley, L. W., "Numerical Nalysis of Natural Convection in Two-Dimensional Square and Circular Containers in Low Gravity," 23rd Meeting of Division of Fluid Dynamics, American Physical Society, Ithaca, New York, November 1980.

Robertson, S. J., Spradley, L. W., and Goldstein, M. P., "Numerical Analysis of Natural Convection in Two-Dimensional Square and Circular Containers in Low Gravity," NASW-281, Interim Report, August 1980, 33 pgs.

Rubin, A. L., "Separation of Lymphocytes by Electrophoresis Under Terrestrial Conditions and at Zero Gravity," NAS8-31513, Final Report, January 1977, 84 pgs.

Saunders, C. P. R., "The SPAR 76-19 Experiments: Charged Water Drop Oscillations," 17th Aerospace Sciences Meeting, New Orleans, LA, January 15-19, 1979, AIAA Paper 79-0224.

Saville, D. A., "Flow Structure and Stability in Continuous Flow Electrophoresis," Physiochem. Hydrodynam. 1 (1980).

Saville, D. A., "Structure of Temperature and Velocity Fields in an Electroosmotically Driven Flow," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Saville, D. A., "Fluid Mechanics of Continuous Flow Electrophoresis," XXI COSPAR Plenary Meeting, Innsbruck, Austria, May 29-June 10, 1978.

Saville, D. A., and Ostrach, S., "Fluid Mechanics of Continuous Flow Electrophoresis," NAS8-31349, Final Report, April 1978.

Saville, D. A. and Lynch, E. D., "Heat Transfer in the Thermal Entrance Region of an Internally Heated Flow," Chem. Engr. Comm., in press, 1980.

Saville, D. A. and Rhodes, P. H., "Thermal Convection in a Laterally Confined Flow," Bull. Am. Phys. Soc. 25, 1097 (1980).

Seaman, G. V. F., "Electrophoretic Mobilities of Tissue Culture Cells in Exponential and Parasynchronous Growth," Nature 207, 86-87 (1965).

Seaman, G. V. F. and Brooks, D. E., "Analytical Cell Electrophoresis," in Electrokinetic Separation Methods (eds, P. G. Righetti, et al.), Elsevier/North-Holland Biomedical Press, 1979, pp. 95-110.

Seaman, G. V. F., Allen, R. E., Barlow, G. H., and Bier, M., "Detailed Results of ASTP Experiment MA-001," Second Euro Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 155-166.

Sen, A. K., Smith, M. K., and Davis, S. H., "Steady Thermocapillary Flows and Their Stability," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Sen, A. K. and Davis, S. H., "Steady Thermocapillary Flows in Two-Dimensional Slots," to be published in Journal of Fluid Mechanics, 1982.

Sengers, J. V. and Moldover, M. R., "Critical Phenomena in a Low Gravity Environment," COSPAR, Space Research, Vol. 18, Pergamon Press, 1978.

Sengers, J. V. and Moldover, M. R., "Critical Phenomena Experiment in Space," Z. Flug. Welt. 2, 371 (1978).

Shankar, N., Cole, R., and Subramanian, R. S., "Thermocapillary Motion of Bubbles Inside Drops," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Shankar, N., Cole, R., and Subramanian, R. S., "Thermocapillary Migration of a Fluid Droplet Inside a Drop in a Space Laboratory," submitted to Int. J. Multiphase Flow 7, 581-594 (1981).

Shankar, N. and Subramanian, R. S., "The Slow Axisymmetric Thermocapillary Migration of an Eccentrically Placed Bubble Inside a Drop in a Space Laboratory," submitted to Journal of Fluid Mechanics, 1981.

Smith, M. K. and Davis, S. H., "Instability of Sheared Liquid Layers," to be published in Journal of Fluid Mechanics, 1982.

Smolka, A. K., "Margel, S., Nerren, B. H., and Rembaum, A., "Electrophoresis Cell Separation by Means of Microspheres," Biochem. Biophys. Acta. 588, 1246-255 (1979).

Smolka, A. K. and McGuire, J. K., "Continuous-Flow Electrophoresis: Membrane-Associated Deviations of Buffer pH and Conductivity," NASA TM-78210, November 1978.

Smolka, A. K. and Miller, T. Y., "Isoelectric Focusing of Red Blood Cells in a Density Gradient Stabilized Column," NASA TM-78268, February 1980, 26 pgs.

Snyder, R. S., "Space Processing on Skylab and ASTP," 1976 NASA Colloquium on Bioprocessing in Space, Houston, TX, March 10-12, 1976, NASA TM-X-58191.

Snyder, R. S., "Electrophoresis Demonstration on Apollo 16," NASA TM-X-64724, November 1972.

Snyder, R. S., "Review of the NASA Electrophoresis Program," in Electrophoresis '81, Walter De Gruyter & Co., Berlin, 1981, pp. 883-897.

Snyder, R. S., Bier, M., Griffin, R. N., Johnson, A. J., Leidheiser, H., Micale, F. J., Vanderhoff, J. W., Rosa, S., and Van Oss, C. J., "Free Fluid Particle Electrophoresis on Apollo 16," Sep. & Purif. Methods 2, 259-282 (1973).

Snyder, R. S. and Allen, R. E., "Static Free-Fluid Electrophores in Space," Materials Sciences in Space with Applications to Space Processing, Progress in Astronautics and Aeronautics, Vol. 52, 1977, pp. 399-410.

Snyder, R. S. and Seaman, G. V. F., "Experimentation in Space an Biorheology," Third International Congress of Biorheology Symposium on Hemorheology in Astronautics, Biorheology 16, 7-11 (1979).

Snyder, R. S. and McGuire, J. K., "Characterization of Continuous Flow Electrophoresis for Improving Resolution and Throughput," submitted to Electrophoresis, 1981.

Spradley, L. W., "Thermoacoustic Convection of Fluids in Low Gravity," 12th Aerospace Sciences Meeting, Washington, D. C., January 1974, AIAA Paper 74-76.

Spradley, L. W., "A Review of Natural Convection Phenomena in Solar Collectors," AIAA 11th Thermophysics Conference, San Diego, CA, July 14-16, 1976, AIAA Paper 76-450.

Spradley, L. W. and Bourgeois, S. V., "Space Processing Convection: G-Jitter Convection of Confined Fluids in Low Gravity," 10th Thermophysics Conference, Denver, CO, May 1975, AIAA Paper 75-695.

Spradley, L. W., Bourgeois, S. V., Fan, C., and Grodzka, P. G., "A Numerical Solution for Thermoacoustic Convection of Fluids in Low Gravity," NASA CR-2269, May 1973, 90 pgs.

Spradley, L. W. and Churchill, S. W., "Pressure and Buoyancy Driven Thermal Convection in a Rectangular Enclosure," J. Fluid Mech. 70, 705-720 (1975).

Strickler, A., "Deflected-Lamina Electrophoresis (DLE): An Approach to High Performance Separation of Biological Materials in Space," 15th Aerospace Sciences Meeting, Los Angeles, CA, January 1977, AIAA Paper 77-233.

Strickler, A., "New Perspectives in Electrophoresis Bioprocessing in Space," 16th Aerospace Sciences Meeting, Huntsville, AL, January 1978, AIAA Paper 78-225.

Subramanian, R. S., "Slow Migration of Gas Bubbles in a Thermal Gradient," AIChE Journal 27, 646-654 (July 1981).

Subramanian, R. S. and Chi, B., "Bubble Dissolution with Chemical Reaction," Chem. Engr. Sci. 35, 2185-2194 (1980).

Subramanian, R. S. and Cole, R., "A Study of Physical Phenomena in Containerless Glass Processing," 17th Aerospace Sciences Meeting, New Orleans, LA, January 1979.

Subramanian, R. S. and Weinberg, M. C., "The Role of Convective Transport in the Dissolution or Growth of a Gas Bubble," J. Chem. Phys. 72, 6811-6813 (1980).

Subramanian, R. S. and Weinberg, M. C., "Asymptotic Expansions in Gas Bubble Dissolution," AIChE 73rd Annual Meeting, Chicago, Illinois, November 1980.

Subramanian, R. S. and Weinberg, M. C., "Asymptotic Expansions for the Description of the Gas Bubble Dissolutions," AIChE Journal 27, 739-748 (1981).

Subramanian, R. S. and Wilcox, W. R., "The Migration of Fluid Droplets and Their Interactions in a Thermal Gradient," Proceedings of the FES Workshop, July 1979, Huntsville, AL.

Sudol, E. D., "Toward the Production of Large-Particle-Size Monodisperse Latexes-The Photoinitiated Emulsion Polymerization of Styrene," Masters Thesis, Lehigh University, 1978.

Symons, E. P., "Zero Gravity Propellant Transfer," Space Transportation System Propulsion Technology Conference, Vol. 4, April 1971.

Taylor, C. R., Rembaum, A., Russell, R., Parker, J., O'Brien, R., and Lukes, R. J., "Human B Lymphocytes in Giesma Stained Preparations," J. Immuno. Methods 17, 81-89 (1977).

Taylor, G. R., "Survey of Cell Biology Experiments in Reduced Gravity," 1976 NASA Colloquium on Bioprocessing in Space, Houston, TX, March 10-12, 1976, NASA TM-X-58191.

Tegart, J. R. and Butz, J. R., "Analysis of Skylab Fluid Mechanics Science Demonstrations," Final Report, NAS8-31109, May 1975.

Todd, P., "Gravity and the Cell: Intracellular Structures and Stokes Sedimentation," 1976 NASA Colloquium on Bioprocessing in Space, Houston, TX, March 10-12, 1976, NASA TM-X-58191.

Todd, P. and Milito, R. P., Boltz, R. C., and Gaines, R. A., "Cell Electrophoresis, in Flow Cytometry and Sorting (Melamed, Mullaney, Mendelsohn, eds.), John Wiley, 1979.

Todd, P., Hymer, W. C., Plank, L. D., Marks, G. M., Kunze, M. E., Giranda, V., and Mehrishi, J. N., "Separation of Functioning Mammalian Cells by Density-Gradient Electrophoresis," in Electrophoresis '81, Walter De Gruyter & Co., Berlin, 1981, pp. 871-882.

Tseng, C. M., El-Aasser, M. S., and Vanderhoff, J. W., "Modeling the Equilibrium Swelling of Latex Particles with Monomers," Organic Coatings & Plastics Chemistry 45, 317-322 (1981).

Vanderhoff, J. W. and Micale, F. J., "Evaluation of Surface Properties in SPAR Electrophoresis," Final Report, NAS8-32657, November 1978, 23 pgs.

Vanderhoff, J. W., El-Aasser, M. S., Micale, F. J., Sudol, E., and Tseng, C. M., "Production of Large-Particle-Size Monodisperse Latexes in Space," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Vanderhoff, J. W., Micale, F. J., and Krumrine, P. H., "Low-Electroosmotic Mobility Coatings for ASTP Free-Fluid Electrophoretic Separation," Sep. Purif. Methods 6, 61-87 (1977).

Vanderhoff, J. W., Micale, F. J., El-Aasser, M. S., Sterk, A. A., Bethke, G. W., Sudol, E. D., and Durbin, D. P., "Heterogeneous Chemical Reactions: Preparations of Monodisperse Latexes," Final Report, NAS8-32399, July 1977.

Van Oss, C. J., Bigazzi, P. E., Gillman, C. F., and Allen, R. E., "Preparative Electrophoresis of Living Lumphocytes," Third Space Processing Symposium: Skylab Results, Vol. II, June 1974, pp. 755-763.

Van Oss, C. J., et al., "Preparative Electrophoresis of Human Lumphocytes," Prepar. Biochem. 4, 457-472 (1974).

Veen, G. E., "Electrophoretic Separator Project M570," NAS8-28365, Final Report, October 1972.

Wallner, L. E. and Nakanishi, S., "A Study of Liquid Hydrogen in Zero Gravity," NASA TM-X-723, August 1963, 65 pgs.

Walter, H. U., Knob, E. J., and Brooks, D. E., "Membrane Surface Properties other than Charge Involved in Cell Separation by Partition in Polymer, Aqueous Two-Phase Systems," Biochem. 15, 2959-2964 (1976).

Wang, T. G., Saffren, M. M., and Elleman, D. D., "Drop Dynamics in Space," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 405-419.

Weinberg, M. C. and Subramanian, R. S., "Dissolution of Multicomponent Bubbles," J. Am. Ceram. Soc. 63, 527-531 (1981).

Weinberg, M. C. and Subramanian, R. S., "Dissolution of Multicomponent Bubbles in Glass Melts," presented at American Ceramic Society 82nd Annual Meeting, Chicago, Illinois, April 1980.

Weinberg, M. C. and Subramanian, R. S., "The Dissolution of a Stationary Bubble Enhanced by Chemical Reaction," Chem. Engr. Sci. 36, 1955-1965 (1981).

Weiss, K. A., Lanhan, J. W., and Richman, D. W., "Investigation of the" Free-Flow Electrophoretic Process," NAS8-32200, May 1979.

Wilcox, W. R., Subramanian, R. S., Papazian, J. M., Smith, H. D., and Mattox, D. M., "Screening of Liquids for Thermocapillary Bubble Movement," AIAA Journal 17, 1022-1024 (September 1979).

Glasses and Ceramics

Ali, M. A. and Larsen, D. C., "Space Processing of Chalcogenide Glass," ITTRI, NAS8-30627, Annual Report, March 11, 1976, 48 pgs.

Anderson, P. M. and Lord, A. E., "The Effects of Structural Relaxation and Crystallization on Isothermal Viscous Flow Near the Glass Temperature in Metglas 2826," Mat. Sci. Engr. 44, 279-284 (1980).

Anderson, P. M. and Lord, A. E., "Exact Values for Crystallization Temperatures at Different Heating Rates from Isothermal Transformation Times," Mat. Sci. Engr. 43, 93-96 (1980).

Anderson, P. M. and Lord, A. E., "Viscosity of Metglas 2826 Near the Glass Transition Using Rapid Heating," J. Noncryst. Solids 37, 219-229 (1980).

Anderson, P. M. and Lord, A. E., "Continuous Cooling (CT) Versus Isothermal Transformation (TTT) Diagrams in Metallic Alloy Glasses," J. Noncryst. Solids 34, 267-272 (1980).

Anderson, P. M. and Lord, A. E., "Correlation Between Viscous Flow and DSC Measurements at the Glass Transition in the Metallic Glass Alloy $Fe_{40}Ni_{40}P_{14}B_6$," Mat. Sci. Engr. 43, 267-270 (1980).

Anderson, P. M. and Lord, A. E., "Demonstration of Phase Transition and Properties of Metallic Glasses for Undergraduates," Am. J. Phys. 46, 80-82 (January 1978).

Doremus, R. H., "Processing of Glass in Space," 17th Aerospace Sciences Meeting, New Orleans, LA, January 1979, AIAA Paper 79-0031.

Doremus, R. H., "Nucleation Theory: Is Replacment Free Energy Needed?" presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Downs, R., Ebner, M., and Nolen, R., "Analysis of Shell Blowing Gases from Metal Organic Gels," J. Am. Vac. Soc. 18, 1272 (1981).

Downs, R. L., Ebner, M. A., and Nolen, R. L., "Glass Shell Manufacturing in Space," Final Report, NAS8-33103, December 21, 1981, 98 pgs.

Dunn, S. A., "Expansion and Concentering of Glass Microballoons, Final Report, November 1977, 35 pgs.

Dunn, S. A., Concentering of Glass Microballoons," Bjorksten Labs, Final Report, November 1977, 44 pgs.

Dunn, S. A., "Glass or Ceramic Concentered Microballoons," Final Report, April 1976, 23 pgs.

Happe, R. A., Possibilities for Producing New Glasses in Space," NAR, Space Processing and Manufacturing Meeting, NASA/MSFC, February 1970, 30 pgs.

Happe, R. A., "Implications of Zero Gravity for Producing New Glasses in Space," J. of Non-Cryst. Solids 3, 375 (1970).

Happe, R. A., "Study of the Production of Unique New Glasses," NASA CR-123740, June 1975, 153 pgs.

Happe, R. A. and Kim, K. S., "Containerless Processing of Glass, Experiment 74-42," SPAR VIII Experiment Report, September 24, 1981, 36 pgs.

Happe, R. A. and Topol, L. E., "Oxide Glass Processing," Third Space Processing Symposium: Skylab Results, Vol. II, M-74-5, June 1974, pp. 887-924.

Happe, R. A. and Topol, L. E., "Experiments Leading to the Production of New Glasses in Space," 12th Aerospace Sciences Meeting, Washington, D.C., January 1974, AIAA Paper 74-159.

Jucha, R. B., Cole, R., et al., "Bubble Rise in Molten Glasses," submitted to Journal of American Ceramic Society, 1981.

Kinser, D. L., "Study of Diffusion Coefficients of Glasses Under 0-G," NAS8-30656, Final Report, March 16, 1977.

Larsen, D. C., "Theoretical Study of the Production of Unique Glasses in Space," NAS8-29850, Final Report, May 1975.

Larsen, D. C. and Ali, M. A., "Space Processing of Chalcogenide Glass," NAS8-30627, Final Report, March 30, 1977, 88 pgs.

Larsen, D. C., Ali, M. A., and Crandall, W. B., "Space Processing of Chalcogenide Glasses," Third Space Processing Symposium: SKylab Results, June 1974, Vol. II, pp. 925-938.

Li, C. T., "Processing $FeBO_3$ Glass-Ceramics in Space," NAS8-31381, Annual Report, October 15, 1976, 46 pgs.

McNeil, T., Cole, R., and Subramanian, R. S., "Surface Tension Driven Flow in Glassmelts and Model Fluids," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Meyyappan, M., Subramanian, R. S., Wilcox, W. R., and Smith, H., "Bubble Behavior in Molten Glass in a Temperature Gradient," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Mukherjee, S. P., "Sol-Gel Processes in Glass Science and Technology," Proceedings of the International Conference on Frontiers of Glass Science, University of California, Los Angeles, July 16-18, 1980.

Mukherjee, S. P., "Gels and Gel Derived Glasses in the Na_2O-B_2O_3-SiO_2 System," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Mukherjee, S. P. and Nielson, G. F., "The Microstructure and Small Angle X-Ray Scattering of Gel-Derived Glasses," American Ceramic Society Meeting, Washington, D.C., May 1981.

Mukherjee, S. P., "Sol-Gel Processes in Glass Science and Technology," J. Noncryst. Solids 42, 477-488 (1980).

Neilson, G. F., "Microstructure and Immiscibility Behavior of Gel-Derived Soda-Silica Glasses," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Nolen, R. L., Downs, R. L., Ebner, M. A., "Glass Manufacturing in Space," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Nolen, R. L., Ebner, M. A., and Downs, R. L., "Shells from Compacted Powders," J. Vac. Sci. Techn. 18 (1981).

Smith, H. D., Mattox, D. M., Wilcox, W. R., Meyyappan, M., and Subramanian, R. S., "Experimental Observation of the Thermo-capillary Driven Motion of Bubbles in a Molten Glass under Zero Gravity Conditions," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Steinberg, J. and Lord, A. E., "Acoustic Emissions Generated at the Glass Transition in Silicate Glasses," J. Am. Ceram. Soc. 63, 234-235 (1980).

Steinberg, J., Tyagi, S., et al., "Thermally-Induced Acoustic Emission in Glasses," NDT International, October 1980, pp. 225-229.

Topol, L. E. and Happe, R. A., "Formation of New Lanthanide Oxide Glasses by Laser Spin Melting and Free Fall Cooling, J. Noncryst. Solids 15, 116-124 (1974).

Topol, L. E. and Happe, R. A., "Formation of New Oxide Glasses by Laser Spin Melting and Free Fall Cooling," J. Noncryst. Solids 12, 377 (1973).

Tyagi, S., Steinberg, J., and Lord, A. E., "Anomalous Thermal Expansion in Amorphous $Fe_{78}Mo_{22}B_{20}$," Appl. Phys. 37, 618-620 (October 1980).

Uhlmann, D. R., "Glass Processing in a Microgravity Environment, presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Weinberg, M. C., Onorato, P. I. K., et al., "The Behavior of Bubbles in Glass Melts: II. Dissolution of a Stationary Bubble Containing a Diffusing and Non-Diffusing Gas," to be published in Journal American Ceramic Society, 1981.

Ultrahigh Vacuum and Containerless Processing Technologies

Agarwal, P. and Bunshah, R. F., "Ultrapure Metals Preparation in Space," NAS8-33115, Final Report, July 1980.

Barmatz, M., "Overview of Containerless Processing Technologies, presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Barmatz, M., Jacobi, N., and Stoneburner, J., "Nonlinear Effect in a High Intensity Acoustic Resonant Chamber," 10th International Congress on Acoustics, July 1980.

Barmatz, M., Stoneburner, J., and Jacobi, N., "Harmonic Generation and Response Curves in a Resonant System," JASA 68, S30 (1980).

Barmatz, M. and Gasper, M., "Scattering Effects of a Sphere in a Cylindrical Resonant Cavity," ASA Meeting, Miami, Florida, December 1981.

Busse, F. H. and Wang, T G., "Torque Generated by Orthogonal Acoustic Waves - Theory," JASA 69 (1981).

Cezairliyan, A., "A Dynamic Technique for Measurements of Thermophysical Properties at High Temperatures," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Colwell, J. H., Cezairliyan, A., Miller, A. P., and Schmid, L. A "High Temperature Thermophysical Property Determinations from Radiative Free-Cooling Experiments," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Croonquist, A. P., Elleman, D. D., Jacobi, N., and Wang, T. G., "Acoustic Positioning and the Response of Large Liquid Drops in Low Gravity," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Das, D. and Kumar, K., "Hot Isostatically Pressed $SmCo_5$ Magnets," IEEE Trans. Mag. MAG-16, 1000-1002 (September 1980).

Drehman, A. J. and Turnbull, D., "Crystal Nucleation in Pd-Si Alloys," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Drehman, A. J. and Turnbull, D., "Solidification Behavior of Undercooled $Pd_{83}Si_{17}$ and $Pd_{82}Si_{18}$ Liquid Droplets," Scripta Met. 15, 543 (1981).

Elleman, D. D., Croonquist, A. P., Jacobi, N., and Wang, T. G., "Containerless Processing Technology Experiment, Dynamics of Liquid Bubbles," SPAR VII Experiment 77-18 Flight I Report, 1981.

Elleman, D. D., Croonquist, A. P., Jacobi, N., and Wang, T. G., "Containerless Processing Technology Experiment, Dynamics of Liquid Bubbles," SPAR VII Experiment 77-18 Flight I Report, 1981.

Elleman, D. D., Croonquist, A. P., and Wang, T. G., "Low-Gravity Acoustic Positioning Chamber for Liquid Shell Studies," Technical Digest of the Conference on Inertial Confinement Fusion, San Diego, CA, February 1980.

Ethridge, E. C. and Dunn, S. A., "Air Jet Levitation Furnace System for Observing Glass Microspheres During Heating and Melting," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Frost, R. T. and Chang, C. W., "Theory and Applications of Electromagnetic Levitation," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Hendricks, C. D., "Levitation, Coating and Transport of Particulate Materials," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Hobson, J. P., "Methods of Improving Vacuum in Space," J. Vac. Sci. Technol. 14, 1279-1280 (November-December 1977).

Hueser, J. E. and Brock, F. J., "Theoretical Analysis of the Density within an Orbiting Molecular Field," J. Vac. Sci. Techn. 13, 702-710 (May/June 1976).

Jacobi, N. and Barmatz, M., "Equilibrium Shapes of Acoustically Levitated Liquid Drops," 1979 Ultrasonics Symposium, Proceedings IEEE, edited by J. DeKlerk and B. McAvoy.

Jacobi, N., Barmatz, M., and Lucero, M., "A Nonlinear Oscillator Model for an Acoustic Resonant Chamber," JASA 68, S30 (1980).

Jacobi, N., Croonquist, A. D., Elleman, D. D., and Wang, T. G., "Acoustically Induced Oscillations and Rotation of a Large Drop in Space," Proceedings of International Colloquium on Drops and Bubbles (1981), to be published.

Kendall, J., "Hydrodynamics Performance of an Annular Liquid Jet: Production of Spherical Shells," Proceedings of Seond International Colloquium on Drops and Bubbles (1981) to be published.

Kerrisk, D. amd Youngberg, C., "Conceptual Design for First Acoustic Containerless Experiment System," 18th Aerospace Sciences Meeting, Pasadena, CA, January 1981, AIAA Paper 81-0163.

Lacy, L. L., Robinson, M. B., and Rathz, T. J., "Solidification Studies of Nb-Ge Alloys at Large Degrees of Supercooling," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Lee, M. C., "Application of an Ultrasonic Focusing Radiator for Acoustic Levitation of Submillimeter Samples," IEEE Ultrasonic Symposium, Chicago, Illinois, October 14-16, 1981.

Lee, M. C., Helizon, R. S., Ladner, G. O., and Wang, T. G., "Real-Time Image Acquisition and On-Line Image Processing of a Hollow Sphere Contained in a Drop Furnace," Technical Digest of the Conference on Inertial Confinement Fusion, San Diego, CA, February 1980.

Lee, M. C., Kendall, J., Elleman, D. D., Rhim, W. K., Helizon, R., Youngberg, C., Feng, I., and Wang, T. G., "Application of Microgravity and Containerless Environments to the Investigation of Fusion Target Fabrication Technology," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Lee, M. C., Kendall, J., Wang, T. G., Johnson, W., and Keck, W., "Investigation of Metallic and Metallic Glass Hollow Spheres for Fusion Target Application," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Lee, M. C. and Feng, I., "An Acoustic Levitating Apparatus for Submillimeter Samples," to be published in Journal of Applied Physics.

Lee, M. C. and Feng, I., "Measurement of Vibrational Relaxation Time of Oxygen Between 475°K and 675°K Using an Acoustic Resonant Technique," to be published in Journal of Acoustic Society of America.

Lee, M. C., Kendall, J., and Johnson, W., "Spheres of Amorphous $Au_{55}Pb_{22.5}Sb_{22.5}$ Alloy and Its Surface Characteristics," to be published in Applied Physics Letters.

Lee, M. C., Feng, I., Elleman, D. D., Wang, T. G., and Young, A., "Generation of a Strong Core Centering Force Submillimeter Compound Droplet System," Proceedings of the International Colloquium on Drops and Bubbles (1981), to be published.

Lee, M. C., Feng, I., Elleman, D. D., Wang, T. G., and Young, A., "Coating of Glass Microballoon Using an Acoustic Technique," Proceedings of the 28th National Symposium of the American Vacuum Society (1981), to be published.

Margrave, J. L., "Estimating Thermodynamics Properties of Solids and Liquids Over Wide Ranges of Temperatures," Proceedings of Conference on Thermophysical Properties, NBS, Washington, D.C., June 15, 1981.

Margrave, J. L., "Heat Capacities of Liquid Metals Above 1500°K," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Melfi, L. T., Outlaw, R. A., Hueser, J. E., and Brock, F. J., "Molecular Shield: An Orbiting Low-Density Materials Laboratory," J. Vac. Sci. Techn. 13, 698-701 (May/June 1976).

Moore, B. C., "Molecular Wake Shields of Various Shapes," J. Vac. Sci. Techn. 16, (May/June 1979).

Moore, B. C., "Proposed Method for Degassing Metals for Extreme Low Pressures," J. Vac. Sci. Techn. 17, 836-837 (July/August 1980).

Nordine, P. C. and Atkins, R. M., "Aerodynamic Levitation of Laser Heated Solids in Gas Jets," submitted to Review of Scientific Instruments, 1981.

Nordine, P. C., Schiffman, R. A., and Sethi, D. S., "Fluorescence Study of High Temperature Aerodynamic Levitation," saccepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Norton, H. N., "Instrumentation Concepts and Requirements for a Space Vacuum Research Facility," JPL Publication 78-105, March 1979.

Oran, W. A., "Proceedings of the Workshop on Electromagnetic Positioning System in Space," NASA CP-2069, October 197 20 pgs.

Oran, W. A. and Naumann, R. J., "Vacuum in the Wake of Space Vehicles," Vacuum, 27 (August 1977).

Oran, W. A., "A Parametric Study of an Acoustic Levitation System," Rev. Sci. Instrum. 51, 626 (1980).

Oran, W. A., "Containerless Melting and Solidification," Proceedings of Electrochemical Society Meeting, St. Louis, MO, May 1980.

Oran, W. A. and Naumann, R. J., "Preliminary Assessment of the Vacuum Environment in the Wake of Large Space Vehicles," NASA TM-78129, July 1972.

Oran, W. A. and Naumann, R. J., "Utilization of the Vacuum Developed in the Wake Zone of Space Vehicles in the LDEF Class," J. Vac. Sci. Technol. 14, 1276-1278 (November-December 1977).

Oran, W. A., Wu, S. T., and Hoffman, R. W., "Proceedings of Workshops to Define Engineering Requirements for a Space Vacuum Research Facility," NASA CP-2091, June 1979, 154 pgs.

Oran, W. A., Reiss, D. A., Berge, L. H., and Parker, H. W., "Preliminary Characterization of a One-Axis Acoustic System," NASA TM-78213, January 1979, 17 pgs.

Oran, W. A., Witherow, W. K., Ross, B. B., and Rush, J. E., "Some Limitations on Processing Materials in Acoustic Levitation Devices," Ultrasonics, IEEE Proceedings, September 1979.

Outlaw, R. A. and Brock, F. J., "Orbiting Molecular-Beam Laboratory," J. Vac. Sci. Technol. 14, 1269-1275 (November/December 1977).

Rey, C. A., Whymark, R. R., Danley, T., Merkley, D., and Vearnd, J., "Present and Future Capabilities of Acoustic Levitation and Positioning Devices," presented at Materials Research Society Meeting, November 16-19, 1981.

Rhim, W. K., Saffren, M. M., and Elleman, D. D., "Electrostatic Levitation Device at JPL," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Rush, J. E., Stephens, W. K., and Ethridge, E. C., "Properties of Constricted-Tube Air-Flow Levitator," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Saffren, M. M. and Elleman, D. D., and Rhim, W. K., "Dynamics of Liquid Shells," Conference on Inertial Confinement Fusion, San Diego, CA, February 1980.

Saffren, M. M., Elleman, D. D., and Rhim, W. K., "Dynamics of a Compound Drop," submitted to Physics Review Letters.

Schmidt, F. A., Lunde, B. K., and Williams, D. E., "The Ultra Purification of Metals by Electrotransport under Outer Space Environmental Conditions," Ames Laboratory, Final Report, 1976, 152 pgs.

Schmidt, F. A., Beck, M. S., and Bevolo, A. J., "Molecular Wake Shield Precursor Experiment," Final Report, February 1979, 29 pgs.

Schmidt, F. A., Outlaw, R. A., and Lunde, B. K., "Electrotransport Purification of Thorium under Low Pressure Conditions," J. Electrochem. Soc. 126, 1811-1817 (October 1979).

Schmidt, F. A., Shanks, H. R., Bevelo, A. J., and Campisi, G. J., "The Preparation of Thin Film Solar Cells under Very Low Pressure Conditions," Final Report (October 1976-September 1977), Ames Lab, 70 pgs.

Spaepen, F. and Turnbull, D., "Negative Pressures and Melting Point Depressions in Oxide-Coated Liquid Metal Droplets,m" Scripta Met. 13, 149 (1979).

Stoneburner, J., Barmatz, M., and Jacobi, N., "Equilibrium Positions of Acoustically Levitated Spheres," JASA 68, S45 (1980).

Tagg, R., Cammack, L., Croonquist, A., and Wang, T. G., "Rotating Liquid Drops: Plateau's Experiment Revisited," JPL Publication 80-66, 1980.

Thompson, C. V. and Spaepen, F., "On the Approximation of the Free Energy Change on Crystallization," Acta Met. 27, 1855 (1979).

Trinh, E., Wang, T. G., and Lee, M. C., "A Technique for the Study of Drop Dynamics in a Liquid-Liquid System," JASA 67, S1 (1980).

Trinh, E. and Apfel, R., "Sound Velocity of Supercooled Water Down to -33°C Using Acoustic Levitation," J. Chem. Phys. 72, 6731 (1980).

Trinh, E. and Wang, T. G., "Internal Flow Fields of Oscillating Liquid Drops," Bull Am. Phys. Soc. (1981).

Trinh, E., Wang, T. G., and Robey, J., "A Non-uniformly Heated Resonant Chamber for Levitation Studies in Air," presented at 102nd Meeting of the Acoustical Society, December 3, 1981.

Trinh, E. and Wang, T. G., "A Quantitative Study of Some Non-Linear Aspects of Drop Shape Oscillations," JASA 68 (1980).

Trinh, E., Zwern, A., and Wang, T. G., "An Experimental Study of Small Amplitude Drop Oscillations in Immiscible Liquid Systems," to be published in Journal of Fluid Mechanics, 1981.

Trinh, E. and Wang, T. G., "Large Amplitude Drop Shape Oscillations: An Experimental Approach," to be published in Journal of Fluid Mechanics, 1981.

Turnbull, D., "Theory of Melt Undercooling," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Turnbull, D., "On Anomalous Prefactors from Analysis of Nucleation Rates," in Progress in Materials Science, Chalmers Anniversary Volume (eds., J. W. Christian, P. Haasen, and T. B. Massalski), Pergamon Press, 1981.

Wang, T. G., "Gravitational Effects on Target Fabrication," Technical Digest of the Conference on Inertial Confinement Fusion, San Diego, CA, February 1980.

Wang, T. G., Elleman, D. D., et al., "Containerless Processing Technology Experiment 76-20," SPAR IV Final Report, NASA TM-78235, January 1980.

Wang, T. G. and Elleman, D. D., "Results of Containerless Science Study from SPAR IV Flight," XXXI IAF Congress, Tokyo, Japan, September 1980.

Wang, T. G., Elleman, D. D., Jacobi, W., and Croonquist, A. P., "Containerless Processing Technology Experiment 76-20," SPAR VI Final Report, NASA TM- 82433, October 1981.

Wang, T. G., Tagg, R., Cammack, L., and Croonquist, A., "Non-Axisymmetric Shapes of a Rotating Drop in an Immiscible System," Proceedings of International Colloquium on Drops and Bubbles (1981), to be published.

Experimental Facilities

Adams, W. R., "Introductory Remarks to M518-Multipurpose Furnace Experiments Performed on Skylab," Third Space Processing Symposium: Skylab Results, Vol. I, June 1974, M-74-5, pp. 131-132.

Aldrich, B. R., "Furnace Systems Development," Third Space Processing Symposium: Skylab Results, Vol. II, M-74-5, June 1974, pp. 581-595.

Bannister, T. C., "Use of TV in Space Activities: Some Considerations," Appl. Opt. 16, 999 (April 1977).

Boese, A., "SPAR II Engineering Report," SPAR II Final Report, NASA TM-78125, November 1977.

Boese, A., McHugh, J., and Siedensticker, R., "Multipurpose Electric Furnace - Experiment MA-010," Apollo-Soyuz Test Project Summary Science Report, Vol. I, 1977, pp. 353-365.

Buerger, E. H., Frost, R. T., Lambert, R. H., O'Connor, M. F., O'Dell, E. L., Napaluch, L. J., Stockhoff, E. H., and Wouch, G., "Electromagnetic Free Suspension System for Space Manufacturing," NAS8-27228, Final Report, December 1972, 158 pgs.

Chi, J. W. H., Seidensticker, R. G., and Duncan, C. S., "Thermal Design and Analyses of Skylab Multipurpose Furnace and Experiments," 1974 AIAA/ASME Thermophysics and Heat Transfer Conference, Boston, MA, July 1974.

Davidson, M. C. and Holland, L. R., "Narrow Zone Heating by a New Radiation Focusing Technique-Toroidal Ellipsoid Furnace," Rev. of Sci. Instrum. 49, 1156 (August 1978).

Debnam, W. J., Fripp, A. L., and Crouch, R. K., "Resusable Clamp That Can Undergo Thermal Cycling for Fused Quartz to Metal Attachment," Disclosure of Invention, November 20, 1980.

Debnam, W. J. and Clark, I. O., "A Technique for Precision Sealing Fused Quartz Ampoules Without Loss of Vacuum Pumping Speed and Without Loss of Wall Strength," Disclosure of Invention, October 1980.

Frost, R. T., "Design Analysis of Levitation Facility for Space Processing Applications," NAS8-29680, Final Report, November 1974, 120 pgs.

Frost, R. T., Napaluch, L. J., Wise, T. D., Stockhoff, E. H., and Wouch, G., "Free Suspension Processing Systems for Space Manufacturing," NASA CR-119954, June 1971, 79 pgs.

Frost, R. T., Stockhoff, E. H., and Wouch, G., "Electromagnetic Containerless Processing Requirements and Recommended Facility Concept and Capabilities for Spacelab," NAS8-29680, May 1974.

Hammel, R. L., "Use of Shuttle for Test of Experimental Hardware in Space," AAS-72 Annual Meeting, Washington, D.C., 1972.

Lacy, L. L., Nisen, D. B., and Robinson, M. B., "Container less High-Temperature Calorimeter," NASA Tech Briefs, Spring 1979, p. 89.

Lagomarsini, G. and Wang, T. G., "Acoustic Containerless Processing Module for Materials Research," 17th Aerospace Sciences Meeting, New Orleans, LA, January 15-17, 1979, AIAA Paper 79-0369.

Lee, M. C., Helizon, R. S., Ladner, G. O., and Wang, T. G., "Real-Time Image Acquisition and On-Line Image Processing of a Hollow Sphere Confined in a Drop Furnace, JPL, NAS7-100, 4 pgs.

McCreight, L. R., Noone, M. J., and Locker, R. J., "Undirectional Solidification Apparatus for Sounding Rockets," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 365-368.

Nerren, B. H., "Development of a Slicing Device for ASTP Electrophoresis Technology Experiment MA-011," NASA TM-X-73395, April 1977, 13 pgs.

Owen, R. B., "Laser Doppler Velocimetry Workshop," summary of Workshop held at Marshall Space Flight Center, February 12, 1979, NASA CP-2084.

Patterson, W. J., "Development of Polymeric Coating for Control of Electroosmotic Flow in ASTP MA-11 Electrophoresis," NASA TM-X-73311, 1976.

Robinson, M. B., Rathz, T. J., et al., "Drop Tube Apparatus for Low-Gravity Solidification," NASA Tech Briefs, MFS25242, 1980.

Ruff, R. C., Facemire, B. R., and Witherow, W. K., "Evaluation of AAFE Apparatus to Measure Residual and Transient Convection in Zero Gravity," NASA TM-78191, August 1978, 36 pgs.

Seidensticker, R. G., "System Design for Free Fall Materials Processing," Third Space Processing Symposium: Skylab Results, Vol. I, June 1974, M-74-5.

Sher, A., Crouch, R. K., Lu, S. S. M., Miller, W. E., and Moriarty, J. A., "Photocapacitive MIS Infrared Detectors," Appl. Phys. Lett. 32, 713-715 (June 1978).

Steurer, W. H., "Selected Examples for Space Manufacturing Processes Facilities and Experiments," Proceedings of Seventh Space Congress, Cocoa Beach, FL, April 1970.

Wang, T. G., Saffren, M. M., and Elleman, D. D., "Acoustic Chamber for Weightless Positioning," 12th Aerospace Sciences Meeting, Washington, D.C., January 1974, AIAA Paper 74-155.

Whymark, R. R., "Acoustic Field Positioning for Containerless Processing," Ultrasonics 13, 251-261 (November 1975).

Whymark, R. R., "Acoustic Positioning for Containerless Processing," Third Space Processing Symposium, Vol. II, M-74-5, June 1974, pp. 647-679.

Whymark, R., "Acoustic Positioning Method for MS/MS Experiments," NASA CR-124300, June 1973, 46 pgs.

Whymark, R., Rey, C., Yearnd, J., and Broz, R., "Acoustic Levitation Materials Processing Systems," 17th Aerospace Sciences Meeting, New Orleans, LA, January 15-17, 1979, AIAA Paper 79-0370.

Williams, J. R., "Space Manufacturing Modules," 6th Space Congress of Canaveral Council of Technical Societies, March 1969, 18 pgs.

Witherow, W. K., "A High Resolution Holographic Particle Sizing System," Opt. Engr. 18, 249-255 (May/June 1979).

Wouch, G. and Lord, A. E., "Eddy Currents: Levitation, Metal Detectors, and Induction Heating," Am. J. Phys. 46, 464-466 (May 1978).

Wouch, G., Okress, E. C., Frost, R. T., and Rutecke, J., "Electromagnetic Levitation Facility Incorporating Electron Beam," Rev. Sci. Instrum. 46, 1122-1123 (August 1975).

General Studies and Surveys

Armstrong, W. O., "Earth Orbital Payload Planning," NASA Space Processing and Manufacturing Meeting, Washington, D.C., February 1970, 30 pgs.

Armstrong, W. O. and Bredt, J. H., "Status and Plans of NASA's Materials Science and Manufacturing in Space (MS/MS) Program," in Space for Mankind's Benefit, 1972, 8 pgs.

Armstrong, W. O. and Bredt, J. H., "Status and Plans of NASA's Materials Science and Manufacturing in Space (MS/MS) Program," Proceedings of the First International Space Congress, Huntsville, AL, November 1971.

Bannister, T. C., "Skylab Science Demonstrations," Third Space Processing Symposium, Vol. I, M-74-5, June 1974, pp. 491-507.

Bannister, T. C., "Post Flight Analyses of Science Demonstrations," Scientific Investigations of the Skylab Satellite Progress, Astron. Aeron. 48, 531-550 (1976).

Berge, L. H., "Positioning and Handling in Weightless Environment," NASA/MSFC, Unique Manufacturing Processes in Space Environment, April 1970.

Bird, J. O. and Waltz, D. M., Requirements and Concepts for Materials Science and Manufacturing in Space Equipment Study, Vols. 2D and 3, NASA CR-120119, July 1973.

Bredt, J. H., "Review of NASA Activities in Materials Science in Space," 19th COSPAR Plenary Meeting, Washington, D.C., 1976, COSPAR Paper D.1.1.

Bredt, J. H., "Space Processing Economics," Processing and Manufacturing in Space Symposium, Frascati, Italy, 1974, ESRO SP-101, pp. 206-208.

Bredt, J. H., "The NASA Space Processing Program," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 81-86.

Bredt, J. H., "Projected Future Space Processing Activities," Third Space Processing Symposium, Vol. II, M-74-5, June 1974, pp. 1045-1051.

Bredt, J. H., "New Space Processing Experiments for the Skylab Missions," 23rd IAF Congress, Vienna, Austria, October 1972, 25 pgs.

Bredt, J. H., "Status of NASA Space Processing Research," Processing and Manufacturing in Space Symposium, Frascati, Italy, March 25-27, 1974, ESRO SP-101, pp. 76-85.

Bredt, J. H., "NASA's Plans for Space Processing Experiments on Sounding Rockets," Proceedings of the Processing and Manufacturing in Space Symposium, Frascati, Italy, March 25-27, 1974, ESRO SP-101, pp. 71-73.

Bredt, J. H., "NASA Activities in Materials Science in Space," Materials Science in Space with Application to Space Processing (L. Steg, ed.), Progress in Astronautics and Aeronautics, Vol. 52, 1977.

Bredt, J. H., "Space Processing," Astron. Aeron. 16, 77-78 (December 1978).

Bredt, J. H. and Montgomery, B. O., "A Challenge to Industry," Astron & Aeron, 21-41 (May 1975).

Bredt, J. H., et al., "Space Shuttle Payload Working Groups," Final Report, Vol. 9, Materials Processing and Space Manufacturing, May 1973.

Brown, R. L. and Zoller, L. K., "Avenues and Incentives for Commercial Use of a Low-Gravity Environment," NASA TP-1925, September 1981, 19 pgs.

Colwell, J. H., "NBS: Materials Measurements," NBSIR 80-2082, J. R. Manning, ed., 1980, pp. 83-113.

Griffin, R. N. and McCreight, L. R., "Unit Separation Processes in Space," Space Processing and Manufacturing in Space Meeting, NASA/MSFC, October 1962, 22 pgs.

Griner, C. S., Johnston, M. H., and Whitaker, A., "The Concept Verification Testing of Materials Science Payloads," NASA TM-X-73320, June 1976, 24 pgs.

Griner, C. S., Johnston, M. H., and Whitaker, A., "The Concept Verification Testing of a Materials Science Payload," 10th Thermophysics Conference, Denver, CO, May 27-29, 1975, AIAA Paper 75-691.

Grodzka, P. G. and Bourgeois, S. V., "ASTP Science Demonstration Data Analysis," Final Report, NAS8-32222, October 1977.

Hall, R. R. and Rives, J. M., "Payload Integration and Operation," AIAA 16th Aerospace Sciences Meeting, Huntsville, AL, January 1978, AIAA Paper 78-182.

Hammel, R. L., "Requirements and Concepts for Materials Science and Manufacturing in Space Payload Equipment Study," NASA CR-120115 to 21, July 1973.

Hardy, S. C. and Fine, J., "NBS: Materials Measurements," NBSIR 80-2082, J. R., Manning, ed., 1980, pp. 3-36.

Hatterick, R. G., "Development of Flight Experiment Work Performance and Workstation Interface Requirments," NASA CR-124409, August 31, 1973, 348 pgs.

McCreight, L. R., "Materials Processing in Space," Society of Aerospace Materials and Process Engineering Proceedings, Vol. 15, Materials and Processes for the 70's, 15th National Symposium and Exhibition, 1969, 10 pgs.

McCreight, L. R., "Use of Shuttle for Manufacturing and Materials Process Experiments in Low-G," Sci. & Techn. 30 (1973).

McCreight, L. R. and Steg, L., "Space Processing-Projections," 23rd IAF Congress, Vienna, Austria, October 1972, 15 pgs.

McGuire, A. D., "Feasibility Studies of Promising Stability and Gravity Including Zero-G Experiments," NASA CR-62482, April 1964, 235 pgs.

McKannan, E. C., "Survey of the US Materials Pprocessing and Manufacturing in Space Program," NASA TM-82427, July 1981, 70 pgs.

McKannan, E. C., "Materials Processing in Space Program Tasks," Office of Space and Terrestrial Applications, December 1978, NASA TM-78214, December 1978.

Manning, J. R., "NBS: Properties of Electronic Materials," Annual Report (April 1978-1979), NBSIR 79-1767.

Naumann, R. J., "Early Space Experiments in Materials Processing," NASA/MSFC, NASA TM-78234, July 1979.

Naumann, R. J., "Descriptions of Space Processing Applications Rocket (SPAR) Experiments," NASA TM-78217, January 1979.

Naumann, R. J., "Materials Processing in Space - An Overview of Studies in the USA," COSPAR Space Research, Vol. 19 (M. J. Rycroft ed.), Pergamon Press, 1979.

Naumann, R. J., "Descriptions of Experiments Selected for the Space Transportation System (STS) Materials Processing in Space Program," NASA TM-78175, May 1978, 28 pgs.

Naumann, R. J., "Materials Processing in Space: A Strategy for Commercialization," AAS Symposium, San Francisco, California, November 1977, 15 pgs.

Naumann, R. J., "Susceptibility of Materials Processing Experiment to Low-Level Accelerations," Proceedings, Workshop on Spacecraft Dynamics as Related to Laboratory Experiments in Space, May 1-2, 1979, MSFC, AL.

Naumann, R. J. and Mason, E. D., "Summaries of Early Materials Processing in Space Experiments," NASA TM-78240, August 1979, 83 pgs.

Ostrach, S., "Skylab Science Demonstrations," Proceedings of Symposium on Space Processing and Manufacturing, Frascati, Italy, March 1974, ESRO SP-101, pp. 11-18.

Passaglia, E. and Parker, R. L., "NBS Materials Science and Manufacturing in Space Research," NBS Final Report, NBSIR 73-402, November 1973.

Passaglia, E. and Parker, R. L., "NBS Materials Science and Manufacturing in Space Research," NBS Annual Report, NBSIR 74-611, November 1974.

Passaglia, E. and Parker, R. L., "NBS Materials Science and Manufacturing in Space Research," NBS Annual Report, NBSIR 76-980, January 1976.

Passaglia, E. and Parker, R. L., "Materials Science and Manufacturing in Space: The NBS Program of Ground-Based Research," Third Space Processing Symposium: Skylab Results, June 1974, Vol. II, M-74-5, pp. 763-765.

Rindone, G. E., "Space Shuttle Offers Exciting Possibilities for Study of Materials and Their Processing under Microgavity," Earth Mineral Sci. 49, (November/December 1979).

Rowell, T. F., "Science Payload III Test Report," SPAR III Final Report, NASA TM-78137, January 1978.

Silverman, S. and Passaglia, E., "Applications of Space Flight in Materials Science and Technology," Proceedings of Conference held at the National Bureau of Standards, Gaithersburg, Maryland, April 20-21, 1977, NBS SP-520.

Steg, L. and McCreight, L. R., "Space Processing - Status Prospects, and Problems - 1974," 23rd IAF Congress, Amsterdam, September 30-October 5, 1974.

Steurer, W. H., "Processing of Materials in Space," Society of Aerospace Materials and Process Engineering Proceedings, Vol. 15, Materials and Processes for the 70's, 15th National Symposium and Exhibition, 1969, 21 pgs.

Steurer, W. H. and Gorham, D. J., "Processing for Space Manufacturing, GD, NAS8-24979, Final Report, June 1970, 268 pgs.

Stockhoff, E. H. and Frost, R. T., Minutes of the Electromagnetic Containerless Processing Task Team Meeting, GE, Valley Forge, PA, April 20, 1979, 44 pgs.

Taylor, K. R., "Space Processing Payload Experiment Requirements," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 87-113.

Taylor, K. R. and Hammel, R. L., "Space Processing Payloads for the Space Shuttle Era," 12th Aerospace Sciences Meeting, Washington, D.C., January 1974, AIAA Paper 74-153.

Taylor, K. R., Hammel, R. L., Smith, A. G., Mock, P. R., and Stevenson, R. D., "Space Processing Payloads for Spacelab," Third Space Processing Symposium: Skylab Results, June 1974, Vol. II, M-74-5, pp. 525-564.

Taylor, K. R., Smith, A. G., Mock, P. R., Stevenson, R. D., and Hammel, R. L., "Requirements and Concepts for Space Processing Payloads, Proceedings of Symposium on Space Processing and Manufacturing, Frascati, Italy, March 1974, ESRO SP-101, pp. 113-135.

Whybrew, J. W., Farrington, J. S., Patz, D. L., and Schultheis, A. C., "Application Analysis of Materials Processing in Space," NAS8-32832, Final Report, February 1980, 60 pgs.

Wuenscher, H. F., "Exploiting Gravity Fields Less than 1-G Manufacturing in Space," Astron. 10, 42-54 (September 1972).

Wuenscher, H. F., "Low and Zero-G Manufacturing in Orbit," Fourth Annual Meeting and Technical Display, October 1967, AIAA Paper 67-842.

Wuenscher, H. F., "New Development in Space Manufacturing, Space Processing and Manufacturing, NASA/MSFC, October 21, 1969, pp. 337-343.

Wuenscher, H. F., "Space Processing on Sounding Rockets," Third Space Processing Symposium, Vol. II, M-74-5, June 1974, pp. 565-579.

Wuenscher, H. F., "Unique Manufacturing Processes in Space Environment," NASA TM-X-67178, April 23, 1970, 23 pgs.

B. EUROPEAN PROGRAM

Crystal Growth

Azouni, M. A., "Local Temperature Measurements Over Ice-Water Interface and Convective Flow Patterns," J. Cryst. Growth 47, 109-115 (1979).

Beck, R., "Crystal Growth of Oxides Using a CO_2 Laser," Proceedings of a Symposium on Processing and Manufacturing in Space, Frascati, Italy, July 1974, ESRO SP-101, pp. 261-265.

Belouet, C., "Growth of Large Single Crystals and Perfection Problems Connected with the Gravitational Field," Proceedings of a Symposium on Processing and Manufacturing in Space, Frascati, Italy, March 1974, ESRO SP-101, pp. 247-260.

Belouet, C., "Fluid Dynamics Problems Connected with Crystal Growth," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 283-290.

Belouet, C., "Vapour Growth in a Microgravity Environment," Thin Solid Films 58, 1-8 (1979).

Belouet, C., "Review of European Proposals for Vapour Growth," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 245-248.

Belouet, C., Monnier, M., and Verplanke, J. C., "Autoradiography As a Total for Studying Iron Segregation and Related Defects in Kh_2PO_4 Single Crystals," J. Cryst. Growth 29, 109-120 (1975).

Belouet, C., Monnier, M., and Crouzier, R., "Strong Isotropic Effects on the Lattice Parameters and Stability of Highly Deuterated D-DKDP Single Crystals and Related Growth Problems," J. Cryst. Growth 30, 151-157 (1975).

Belouet, C., Dunia, E., and Petroff, J. F., "X-Ray Topographic Study of Defects in KH_2PO_4 Single Crystals and Their Relation with Impurity Segregation," J. Cryst. Growth 23, 243-252 (1974).

Benz, K. W., "Single Crystals of Electronic Materials Grown in a Space Environment," Processing and Manufacturing in Space Symposium, Frascati, Italy, March 1974, ESRO SP-101, pp. 163-170.

Benz, K. W. and Muller, G., "III-V Semiconductor Crystals Grown by the Travelling-Heater Method," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 369-373.

Benz, K. W. and Weiss, H., "Crystal Growth of III-V Semiconductors Under 0-G Conditions," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 217-222.

Cadoret, R., "Resultsats des Experiences Francaises de Croissance en Phase Vapeur Effectuees au Sol dans le Cadre des Projects Spatiaux, Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 363-367.

Choukroun, J. C., Launay, J. C., et al., "Definition des Regimes Hydrodynamiques Recontres au Cours de la Cristallisation par Transport en Phase Gazeuse," J. Cryst. Growth 46, 644-654 (1979).

Desre, P. J. and Joud, J. C., "Surface Tension Temperature Coefficients of Liquid Alloys and Definition of a 'Zero Marangoni Number Alloy' for Crystallization Experiments in Microgravity Environment," XXXI IAF Congress, Tokyo, Japan, September 1980, Preprint 80-144.

Elwell, D., "Priorities in the Initial Use of Spacelab for Crystal Growth," Proc. R. Soc. Lond. Series A 361, 151- 161 (May 1978).

Elwell, D., "Measurement of Properties of High Temperature Solutions," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 249-255.

Elwell, D. "Morphological Stability of a Crystal Growing in Solution", NASA workshop on Fluids Experimental System, July 11-12, 1979, Huntsville, AL.

Eyer, A. and Nitsche, R., "Preparatory Experiments for the Growth of Silicon Single Crystals in the Mirror Heating Facility of Spacelab," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 75-80.

Eyer, A., Nitsche, R., and Zimmerman, H., "Flussig- und Gaszonenkristallisation unter Schwerelosigkeit," Status-Seminar Spacelab-Nutzung, Bad Schliersee (1975). Report issued by the German Ministry of Research and Technology.

Eyer, A., Nitsche, R., and Zimmerman, H., "Flussig- und Gaszonenkristallisation unter Schwerelosigkeit, Teil II," Status-Seminar Spacelab-Nutzung, Meersburg (1977). Report issued by the German Ministry of Research and Technology, DGLR 78-02.

Eyer, A., Nitsche, R., and Walcher, H., "Zuchtung von Si- und CdTe-Kristallen im Spiegelofen," Status-Seminar Spacelab-Nutzung, Tubingen (1978). Report issued by the German Ministry of Research and Technology, DGLR 79-01.

Eyer, A., Nitsche, R., Schuhmacher, M., and Walcher, H., "Gaszonenzuchtung im Spiegelofen," Status-Seminar Spacelab-Nutzung, Munchen (1979). Report issued by the German Ministry of Research and Technology, DGLR 80-01.

Favier, J. J., "Initial Transient Segregation During Unidirectional Solidification of a Binary Alloy in a Furnace with Thermal Damping," J. Cryst. Growth 49, 373-380 (1980).

Favier, J. J., "Reconsideration de la Macrosegregation en Solidification non Stationnaire," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 297-305.

Favier, J. J., "Transient Growth Effects During Space Solidification Experiments in a Bridgman Configuration," XXIII COSPAR Plenary Meeting, Budapest, Hungary, June 1980.

Favier, J. J., "Striations of Kinetic Origin Induced During Non-Steady State Solidification," presented at 5th International Conference on Vapor Growth and Epitaxy, Coronado, CA, July 1981.

Favier, J. J., "The Thermal Investigation of Solidification Carried Out in a Cartridge Furnace in Space," COSPAR XXI, Innsbruck, Austria, June 1978, pp. 535-543.

Favier, J. J., Arragon, Ph., Martin, E. P., and Witt, A. F., "Analyse non stationnaire de la macrosegregation pendant la solidification dans l'espace du systeme Ge-Ga," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 306-308.

Favier, J. J. and Malmejac, Y., "The Contribution of Microgravity Experiments to the Study of Solidification Mechanisms," J. Brit. Interplant. Soc. 31, 271-274 (1978).

Gits-Leon, S., Lefaucheux, F., et al., "Effects of Stirring on Crystalline Quality of Solution Grown Crystals-Case of Potash Aluminum," J. Cryst. Growth 44, 345-355 (1978).

Langbein, D, "Heat Flow and Convection in the Travelling-Solvent Method," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 223-230.

Lefaucheux, F., Robert, M. C., and Arend, H., "Crystal Quality of Gel Grown $CaHP)_4 2H_2O$ Crystal," J. Cryst. Growth 47, 313-314 (1979).

Littke, W., "The Growth of Single Crystals from Proteins in Gravity-Free Space," 17th Aerospace Sciences Meeting, New Orleans, LA, January 1979, AIAA Paper 79-0311.

Muller, G., "Crystal Growth at Gravity Greater than 1-G," Second, Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 213-216.

Nielson, K. F., "Diffusion Growth of Organic Charge-Transfer Crystals," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 256-258.

Perrier, G. and Omely, J., "Vapour Growth of HgI_2 in Sealed Ampoulas," XXI COSPAR Meeting, Innsbruck, Austria, June 1978.

Potschke, J., "Preparation of Dispersed Alloys Under Microgravity Conditions," XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-145.

Rodot, H., "Bridgman Technique in Space: Problems Related to Material Positioning in the Case of Volatile Components," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 231-240.

Rodot, H., "Electronic Materials Purification and Space Conditions," Proceedings of Symposium on Processing and Manufacturing, Frascati, Italy, March 1974, ESRO SP-101, pp. 243-246.

Uelhoff, W. and Gartner, K. J., "A Television Picture Processing System for the Investigation of Crystal Growth Processes," XX COSPAR Plenary Meeting, Innsbruck, Austria, June 1978.

Walter, H. U., "Containerless Processing of Single Crystals in Low-G Environment," 12th Aerospace Sciences Meeting, Washington, D.C., November 1974, AIAA Paper 74-1241.

Walter, H. U., "Stability of Multicomponent Mixtures Under Microgravity Conditions," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 244-254.

Walter, H. U., "A Mechanism for Generation of Pulsating Growth and Non-Rotational Striation in Melt Growth Crystals, I. Initial Transient Region," J. Electrochem. Soc. 123, (July 1976).

Walter, H. U. and Favier, J. J., "Directional Solidification of Doped Semiconductors and Eutectic Alloys During a Sounding Rocket Flight," XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-139.

Weiss, H., "Criteria for Selection of Crystal Growth Techniques, Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 207-212.

Wenzl, H., "Crystal Growth from the Melt in 0-g and 1-g with the Czochralski Method," 19th COSPAR Plenary Meeting, Philadelphia, PA, June 1976.

Metals, Alloys, and Composites

Ahlborn, H., "Aluminum-Indium Experiment SOLUOG-A Sounding Rocket Experiment on Immiscible Alloys," 17th Aerospace Science Meeting, New Orleans, LA, January 1979, AIAA Paper 79-0172.

Ahlborn, H., "Possibilities for Improving Alloys with Special Physical Properties in Space," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 197[illegible] ESA SP-114, pp. 309-312.

Ahlborn, H., "Metallurgical Applications of a Space Environment," Processing and Manufacturing in Space Symposium, Frascati, Italy, March 1974, ESRO SP-101, pp. 155-162.

Ahlborn, H. and Lohberg, K., "Low Gravity Experiments on Decomposition and Solidification of Aluminum-Indium Alloys," Statsu Seminar 1978 des Bundesministeriums fur Forschung und Technologie, Herausgeber, DFVLR, Koln, Germany, 1979.

Antona, P. L., "Fabrication de Materiaux Composites en Microgravite (Experience es 310 du 1er Vol Spacelab)," Third Eur[illegible] Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 109-114.

Bergman, A. and Fredriksson, H., "A Study of the Coalescence Process Inside the Miscibility-Gap in Zn-Bi Alloys," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Bergman, A., Carlberg, T., Fredriksson, H., and Stjerndahl, J., "The Influence of Gravity on the Solidification of Monotectic and Nera Monotectic Cu-Pb Alloys," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Carlberg, T., Solidification of Some Eutectic Alloys Under Microgravity Conditions and at 1-G," Third Euro. Sym. on Mat. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 221-232.

Carlberg, T. and Fredriksson, H.,"The Influence of Microgravity on the Structure of Bi-Zn Immiscible Alloys," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 24-27, 1979, ESA SP-142, pp. 233-243.

Castellani, L., Gondi, P., Barbieri, F., and Costa, N., "Dispersed, Gaseous, and Solid Phases in Molten and Solidified Cu," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 81-88.

Caton, P. D. and Hopkins, W. G., "The Preparation and Stability of Metallic Emulsions in a Microgravity Environment - An Experiment F.S.L.P.," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 89-94.

Coenen, H. P. and Klein, P., "Stoff-und Warmetransport in Flussigkeiten und Gasen unter verminderter Schwerkraft," Krupp Research Institute, Essen, West Germany, Status-Seminar, 1977 des Bundesministeriums fur Forschung und Technologie, DGLR-Bericht 78-02 (1978), 237-246.

Coenen, H., Gast, Th., and Krischker, P., "Untersuchungen und Auswahl geeigneter Methoden zur Warmeleitfahigkeitsmessung an Flussigkeiten im "SPACELAB"," Technische Mitteilungen Krupp Forschungsberichte 35 (1977), 145-156.

Coenen, H., Gast, Th., and Krischker, P., "Untersuchungen und Auswahl geeigneter Methoden zur Warmeleitfahigkeitsmessung an Flussigkeiten im "SPACELAB"," Forschungsbericht W 78-09 des Bundesministeriums fur Forschung und Technologie, West Germany, September 1978.

Deruyttere, A. Aernoudt, E., et al., 'Silver Samples Melted in Skylab Experiment M565," Proceedings of Symposium on Processing and Manufacturing in Space, Frascati, Italy, March 1974, ESRO SP-101, pp. 27-44.

Deruyttere, A. and Aernoudt, E., "M565 Silver Grids Melted in Space," Third Space Processing Symposium: Skylab Results, Vol. I, M-74-5, June 1974, pp. 159-203.

Desforges, C. D., "Immiscible Alloy Experiments in Space," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1979, ESA SP-114, pp. 301-308.

Desforges, C. D., "Multiphase Solidification," Proceedings of a Symposium on Processing and Manufacturing in Space, Frascati, Italy, March 1974, ESRO SP-101, pp. 229-234.

Favier, J. J., "Reconsideration de la Macrosegregation en Solidification non Stationnaire," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 297-308.

Fredriksson, H., "Possible Dendritic Growth and Segregation Phenomena During Solidification of Alloys in Space," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 291-300.

Fredriksson, H., "The Effect of the Natural Convection on the Transition from Equeaxed to Columnar Crystals," accepted for publication in Proceedings of Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Frieler, K., Strickler, R., and Siegfried, E., "Brazing Under Microgravity in a Resistance Heated Furnace," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Garland, J. G. and McKeown, D., "Metallographic Assessment of Skylab Experiment M551," Proceedings of a Symposium on Processing and Manufacturing in Space, Frascati, Italy, March 1974, ESRO SP-101, pp. 45-64.

Haag, J., "Bedeutung der Benerzbarkeit fur die Herstellung von Verbundwerkstoffen unter Welttruambedingungen-Coe en, Einflusse und Modelle," Forshungebericht W81-021 Luft-und Raumfahrt - Weltraumforschung/Welttraumtechnologie, Max-Planck- Institut, Stuttgart, August 1981, 282 pgs.

Hau, E. and Leven, P., "Moglichkeiten fur industrielle Materialsherstellung und Fertigungsverfahren im Weltraum aus dem Bereich des Maschinenbaues," BMFT-FB, w 76-03, April 1976.

Heye, W. and Klemm, M., "Melting of a PbAgBaO-Powder Alloy Under 0-G Environment (Rocket Flight), Deformed to Wires," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 381-390.

Krupp, F., "Grundlagenuntersuchungen im System Mangan Wismut unter verminderter Schwerkraft in TEXUS II," Krupp Research Institute, Essen, West Germany, April 27, 1979, pp. 1-21.

Lemaignan, C., "Etude de l'Influence de la Gravite sur la Solidification des Eutectiques Irreguliers," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 385 390.

Lemaignan, C. and Malmejac, Y., "Interest and Difficulties of 0-G Studies of the Mechanisms of Eutectic Growth," 19th COSPAR Plenary Meeting, Philadelphia, PA, 1976, Paper D.2.4.

Leven, P. and Rossman, A., "Quality Improvement for Space-Processed Turbine Blades," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 319-332.

Lohberg, K., "Results of Studies on Wetting Behavior," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 375-380.

Luyendijk, T. and Nieswaag, H., 'Undirectional Solidification of Eutectic Iron-Carbon Alloys and the Segregation of Sulphur," Third Euro. Sym. on Mat. Sci. in Space, Grenoble France, April 1979, ESA SP-142, pp. 115-122.

Malmejac, Y., "Review of Possible Eutectic Alloy and Thermodiffusion Experiments," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 313-318.

Neuschutz, D., "Erstarrung einer Legierung mit Oxideinschlussen in TEXUS I," Krupp Research Institute, Essen, West-Germany, Abschlu bericht Projekt TEXUS I, (1977) 87-92, DFVLR, PT, Koln, West-Germany.

Neuschutz, D., "Wechselwirkung zwischen einer fortschreitenden Erstarrungsfront und suspendierten Fremdteilchen," Krupp Research Institute, Essen, West-Germany, Status-Seminar 1977 des Bundesministeriums fur Forschung und Technologie, DGLR-Berichte 78-02 (1978) 67-73.

Neuschutz, D. H., Coenen, W., Gans, W., and Potschke, J., "Gefugeausbildung und Seigerungen beim Erstarren technischer Legierungen-Studie uber Untersuchungsmoglichkeiten im SPACELAB," Krupp Research Institute, Essen, West-Germany, Forschungsberichte W 77-08 des Bundesministeriums fur Forschung und Technologie, West-Germany, December 1977, ESA Technical Translation 539, July 1979.

Neuschutz, D. and Potschke, J., "Wechselwirkung zwischen einer fortschreitenden Erstarrungsfront und suspendierten Fremdteilchen," Technische Mitteilungen Krupp-Forschungsberichte 37 (1979) 81-82.

Pant, P., "Fundamental Studies in the Mananese-Bismuth System," Krupp Research Institute, Essen, West-Germany, Final Report Project TEXUS II (1978) 48-61, DFVLR, PT, Koln, West-Germany.

Pant, P., "Grundlagenuntersuchungen im System Mangan-Wismut unter verminderter Schwerkraft im Rahmen des TEXUS II-Projecktes," Technische Mitteilungen Krupp-Forschungsberichte 37 (1979) 70-78.

Philippovich, N., Strickler, R., et al., "Brazing Under Microgravity - TEXUS II Experiment," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 95-100.

Potard, C., "A Review of the Mechanisms Involved in the Directional Solidification of Al-In Emulsions at Zero Gravity", J. Brit. Interplan. Soc. 31, 275-280 (1978).

Potard, C., "Etudes de Base Preparation de L'Experience de Solidification Dirigee D'Alliages Immiscible Al-In en Fusee Sonde," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 255-262.

Potard, C., "Directional Solidification of Al-In Alloys at Microgravity: Results of Basic Preparatory Investigators," 17th Aerospace Sciences Meeting, New Orleans, LA, January 1979, AIAA Paper 79-0173.

Potard, C., "Interet de Courtes Periodes D'Impesanteur Pour L'Etude de la Solidification des Alliages Immiscibles Al-In," Proceedings of Esrange Symposium, Ajaccio, April 1978, ESA SP-135.

Potschke, J., 'Untersuchungen zur Warmeleitfahigkeitsmessung an flussigen Metallen," Technische Mitteilungen Krupp Forschungsberichte 37 (1979) 83-90.

Potschke, J. and Neuschutz, D., "Solidification of an Alloy with Oxide Inclusions," Krupp Institute, Essen, West-Germany, Final Report Project TEXUS II (1978) 158-177, DFVLR, PT, Koln, West-Germany.

Reboux, J., "Use of Electromagnetic Fields for Positioning and Stirring Materials under 0-G," Proceedings of Symposium on Processing and Manufacturing in Space, Frascati, Italy, July 1974, ESRO SP-101, pp. 311-326.

Schweitzer, K., Wortmann, J., and Sprenger, H., "Space Processing of Turbine Blades by Means of Skin Technology," Adv. Astron. Sci. 36, 257 (1978).

Sprenger, H., Erben, E., Zeilinger, H., and Schweitzer, K., "Skin Technology," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 101-108.

Sprenger, H., Erben, E., et al., "Skin Technology - An Industrial Application on Space Processing," Acta Astron. 5, 625-635 (1978).

Sprenger, H., Erben, E., et al., "Stutzhauttechnologie," Proceedings of "Spacelab-Nutzung, Werkstofforschung und Verfahrenstechnik," Meersburg, Germany, October 1977, DGLR-Berichte 78-02, pp. 75-82.

Sprenger, H., Erben, E., et al., "Herstellung hochwertiger Maschinenbauteille unter Schwerelosigkeit - Ansatze zur industriellen Nutzung des Spacelab," Metall. 31, 1360-1363 (December 1977).

Sprenger, H., Schweitzer, K., et al., "Potential der Stutzhauttechnologie," Proceedings of "Werkstofforschung und Verfahrenstechnik im Weltraum," Munich, Germany, September 1979, DGLR-Report 80-01, pp. 213-227.

Sprenger, H. and Schweitzer, K., "Skin Casting Experiments in Rocket Flights," 5th ESA Symposium on European Rocket and Balloon Progress and Related Research, Bournmouth, U.K., April 1980, ESA SP-152, pp. 349- 356.

Sprenger H. and Schweitzer, K., "Texus Experiments on Skin Technology," XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-139.

Fluids, Transports, and Chemical Processes

Aydelott, J. C., "Axial Jet Mixing of Ethanol in Cylindrical Containers During Weightlessness," NASA TP-1487, July 1979.

Bataille, J., Dupuy, J., Girodroux, Ph., and Mellon, H., "On the Possibility of Measuring the Soret Coefficient Under Zero-Gravity Conditions: A Preliminary Stability Analysis," XX COSPAR Plenary Meeting, Tel Aviv, Israel, June 1977.

Beck, R., Gurs, K., and Segers, G., "Observations, Estimates and Suggested Experiments Relating to Surface-Tension Induced Thermoconvection," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, pp. 259-263.

Berns, J. A., et al., "Photographic Investigation of Liquid Behavior on Temperature and Liquid-Vapor Sensors Used in Low-Gravity Environment," NASA TM-X-1438, September 1967.

Bewersdorff, A., "Space Experiments on Chemical Pattern Formation," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 313-316.

Bewersdorff, A., "A Mechanism for Macroscopic Phase Separations in Emulgated Liquid Systems," COSPAR XXI Plenary Meeting, Innsbruck, Austria, May 29-June 10, 1978.

Bruckner, R., "Instabilities of Interfaces and Interfacial Convection," 19th COSPAR Plenary Meeting, Philadelphia, PA, 1976, Paper D.3.6.

Bruckner, R., "Fundamental Experiments on Interfacial Convection: Project TEXUS I and II," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 267-272.

Bruckner, R., "Interfacial Convection Observed Under Microgravity Conditions During the TEXUS I Experiment," XXI Plenary COSPAR Meeting, Innsbruck, Austria, May 29-June 10, 1978, pp. 511-513.

Brueckner, A., "Interfacial Convection Observed Under Microgravity Conditions During the TEXUS I Experiment," 17th Aerospace Sciences Meeting, New Orleans, LA, January 1979, AIAA Paper 79-0171.

Chun, C. H. and Wuest, W., "Flow Phenomena in Rotating Floating Zones With and Without Marangoni Convection", Third Euro. Symp. on Material Sciences in Space, Grenoble, France, April 1978, ESA SP-142, pp. 282-288.

Chun, C. H. and Wuest, W. "Flow Phenomena in Gravitationless Melting Zones in the Presence of Electromagnetic Fields," 20th COSPAR Plenary Meeting, Tel Aviv, Israel, June 1977.

Chun, C. H., Wuest, W., "Suppression of Temperature Oscillations of Thermal Marangoni Convection in a Floating Zone by Superimposing of Rotating Flows," XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-128.

DaRiva, I., Some Physical and Chemical Processes in Fluids," Proceedings of Symposium on Processing and Manufacturing in Space, Frascati, Italy, March 1974, ESRO SP-101, pp. 171-183.

DaRiva, I. and Ruesga, J. M., "Fluids Physics Module Experiments," Second. Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 265-275.

DaRiva, I. and Martinez, I., "Floating Zone Stability (Experiment 1-ES-331)," Third Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 67-73.

Da-Riva, I. and Pereira, E. A., "A Regular Perturbation Approach to Surface Tension-Driven Flows," presented at XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-127.

Eckhardt, K. and Netter, G., "The Experiment for Investigation of the Dynamic Behavior of Fluid in a Surface Tension Tank under Microgravity Condition," presented at XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-133.

Favier, J. J., "Effect of Heat Exchanges on the Solidification Rate in a Thermal Gradient Furnace," 16th Aerospace Sciences Meeting, Huntsville, AL, January 1978, AIAA Paper 78-271.

Favier, J. J., Lethier, J., Arragon, Ph., Malmejac, Y., Khryapov, V. T., and Barmin, I. V., "Solid/Liquid Interface Stability in Normal and Microgravity Conditions: The ELMA 01 Experiments," presented at IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-142.

Fevillebois, F. and Lasek, A., "Deplacement D'un Liquide dans un Tube Capillaire en Microgravitation," 20th COSPAR Plenary Meeting, Tel Aviv, Israel, June 1977.

Foster, P. R. and Ross, D. A., "Electrophoresis Data Retrieval for Analysis and Process Control," Processing and Manufacturing in Space Symposium, Frascati, Italy, March 1974, ESRO SP-101, pp. 289-299.

Gal, V. V., "Spread of Liquid on a Surface in a State of Weightlessness," High Temp. 10, 181-812 (1972).

Gayle, J. B., Egger, C. T., and Bransford, J. W., "Freezing of Liquids on Sudden Exposure to Vacuum," J. Spacecraft 1, 323- 326 (June 1964).

Graziani, G., Strani, M., and Piva, R., "Effect of Free Surface Radiation in Axisymmetric Thermocapillary Flows," presented at XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-134.

Habip, L. M., "On the Mechanics of Liquids in Subgravity," Astr. Act. 11, 401-409 (1965).

Hannig, K., "Biological Application: General Review," Proceedings of a Symposium on Processing and Manufacturing in Space, Frascati, Italy, 1974, ESRO SP-101, pp. 199-203.

Hannig, K., "Detailed Results of ASTP Experiment MA-014," Proceedings of a Symposium on Processing and Manufacturing in Space, Frascati, Italy, 1974, ESRO SP-101, pp. 282-287.

Hannig, K. and Schindler, R., "Overview of Electrophoresis Experiments on ASTP," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 27-31.

Hannig, K., Wirth, H., and Schoen, E., "Electrophoresis Experiment MA-014," Apollo-Soyuz Test Project Summary Science Report, Vol. 1, 1977, pp. 335-351.

Hannig, K. and Wirth, H., "Detailed Results of ASTP Experiment MA-014 (Continuous Flow Electrophoresis)," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 135-140.

Hannig, K., Wirth, H., Meyer, B. H., and Zeiller, K., "Free-Flow Electrophoresis, I. Theoretical and Experimental Investigations of the Influence of Mechanical and Electrokinetic Variables on the Efficiency of the Method," Hoppe-Seyler's Z. Physiol. Chem. 356, 1209-1223 (August 1975).

Hannig, K., Wirth, H., Schindler, R. K., and Spiegel, K., "Free-Flow Electrophoresis, III. An Analytical Version for a Rapid, Quantitative Determination of Electrophoretic Parameters," Hoppe-Seyler's Z. Physol. Chem. 358, 753-763 (July 1977).

Haynes, J. M., "Capillary Instabilities in 1-G and 0-G," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, 1976, ESA SP-114, pp. 467-471.

Haynes, J. M., "Fundamental and Applied Aspects of Fluid Physics Under Microgravity," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 275-279.

Herranz-Martinez, L., "Floating Zone Under Reduced Gravity-Axisymmetric Equilibrium Shapes," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 277-282.

Labus, T. L., De Witt, K. J., "Liquid Jet Impingement Normal to a Disk in Zero Gravity," J. Fluids Engr. 100, 204-209 (June 1978).

Leihener, D., "Immunological Aspects in Space Experiments and the Possibilities of Cell Separation by Continuous Flow Electrophoresis," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 149-154.

Melcher, J. R., Guttman, D. S., Hurwitz, M., "Dielectrophoretic Orientation," J. Spacecraft 6, 25-32 (January 1969).

Merte, J. R., "Incipient and Steady Boiling of Liquid Nitrogen and Liquid Hydrogen Under Reduced Gravity," NASA CR-103047, November 1970.

Meseguer, J., "The Breaking of a Cylindrical Floating Zone," XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-126.

Napolitano, L. G., "Thermodynamics and Dynamics of Pure Interfaces," Acta Astron. 5, 655-670 (1978).

Napolitano, L. G., "Mathematical Modeling of Marangoni Flows," Meccanica 12 (1978).

Napolitano, L. G., "Electrofluid Dynamics of Interfaces," Space Research, (M. J. Rycroft, Ed.), Vol. 19, Pergamon Press, 1979.

Napolitano, L. G., "Thermodynamics and Dynamics of Surface Phases," Acta Astron 6, 1093-1112 (1979).

Napolitano, L. G., "Marangoni Boundary Layers," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 349-358.

Napolitano, L. G., "Thermodynamics and Dynamics of Line Phases," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 289-296.

Napolitano, L. G., "Macroscopic Modeling of the Thermodynamics and Dynamics of Interfaces," 16th Aerospace Sciences Meeting, Huntsville AL, January 1978, AIAA Paper 78-222.

Napolitano, L. G., "Surface and Buoyancy Driven Flow Convection," presented at XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-145.

Napolitano, L. G. and Vetrella, S., "Zeroth-Order Boundary Layer Theories for Gas-Mixture Free-Convection Problems," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 433-446.

Oertel, H., "Numerical and Experimental Simulation of Microgravity Convection," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 335-340.

Oertel, H., "Convection Under Normal and Reduced Gravity," XXI COSPAR Meeting, Innsbruck, Austria, 1978.

Oertel, H. and Buhler, K., "A Special Differential Interferometer Used for Heat Convection Investigations," J. Heat & Mass Transfer 21, 1111-1115 (1978).

Otto, E. W., "Static and Dynamic Behavior of the Liquid-Vapor Interface During Weightlessness," Aero. Chem. Engr. 62, 158-177 (1966).

Padday, J. F., "Behavior of Liquid Zones in a Microgravity Environment," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-412, pp. 281-282.

Padday, J. F., "Capillary Forces and Stability in Zero Gravity Environment," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 447-454.

Peeters, H., "Specific Problems of Electrophoresis in Space," Proceedings of a Symposium on Processing and Manufacturing in Space, Frascati, Italy, 1974, ESRO SP-101, pp. 273-278.

Peeters, H., "Separation Methods in Space Biology," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, 1975, ESA SP-114, pp. 129-134.

Persson, T., "An Experimental Method for Determination of Mass Transport in Liquid Metals to be Applied Under Microgravity," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 391-396.

Rodot, H., "La Microgravite, moyen d'etude des fluides et des cristaux," Colloque C2, Supplement au n 6, Tome 39, June 1978, pp. 128-129.

Rodot, H., Bisch, C., and Lasek, A., "Zero Gravity Simulation of Liquids in Contact with a Solid Surface," Acta Astron. 6, 1083-1092 (1979).

Sarma, G. S. R., "Marangoni Convection in a Liquid Layer Subjected Rotation about a Transverse Axis," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 359-362.

Sarma, G. S. R., "Marangoni Convection in a Fluid Layer under the Action of a Transverse Magnetic Field," XXI COSPAR Plenary Meeting, Innsbruck, Austria, 1978.

Sarma, G. S. R., "Interface Phenomena and Transport Processes Under Reduced Gravity," Materials Science in Space with Application to Space Processing, Progress in Astronautics and Aeronautics, Vol. 52, 1977.

Scorran, D. E. and Hoffer, T. W., "Drop Vibration at Near Zero Gravity," J. Rech. Atmos. 10, 9-15 (January 1976).

Schwabe, D., Scharmann, A., and Preisser, F., "Steady and Oscillatory Marangoni Convection in Floating Zones Under 1-G," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 327-334.

Schwabe, D., Preisser, F., and Scharmann, A., "Verification of the Oscillatory State of Thermocapillary Convection in a Floating Zone under Low Gravity," XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-148.

Siekmann, J., "Shaping and Degassing the Liquified Matter Under Simulated Low and Zero Gravity," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 421-432.

Siekmann, J., "Migration of Gas Bubbles Under Various Force Fields in a Microgravitational Environment," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 341-343.

Siekmann, J. and Johann, W., "Remarks on Surface Films in Two Phase Flows," presented at XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-131.

Watt, J. G., "Isoelectric Focusing and Forced-Flow Electrophoresis," Processing and Manufacturing in Space Symposium, Frascati, Italy, March 1974, ESRO SP-101, pp. 279-282.

Wuest, W., "Fluid Dynamics of the Floating Zone," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 455-466.

Glasses and Ceramics

Deutscher, E., "Interest in Solidification of Glasses and Ceramics in Space," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 401-403.

Deutscher, K., "The Influence of Space Processing on Glass Technology," Proceedings of Symposium on Processing and Manufacturing in Space, Frascati, Italy, March 1974, ESRO SP-101, pp. 185-190.

Herr, K., Barlage-Hilgefort, H. J., and Frischat, G. H., "Reactions Between Glass Melts," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 263-266.

Savage, C. H. and Leipold, M. H., "Space Processing of Ceramic Materials," Proceedings of a Symposium on Space Processing and Manufacturing, Frascati, Italy, 1974, ESRO SP-101, pp. 191-198.

Ultrahigh Vacuum and Containerless Processing Technologies

Bewersdorff, A. and Gorler, G. P., "Controlled Action on Suspended Particles by Crossed Electric and Magnetic Fields," presented at Materials Research Society Meeting, Boston, MA, November 16-19, 1981.

Experimental Facilities

Adorni, N., Ghersini, G., Sona, P. G., Rossitto, F., and Cortellazzi, G., "UHV-Chamber: Theoretical Background and Facility Development," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 125-132.

Anton, H. S., "Overview of the Scientific Instrumentation of the German Microgravity - Mission D1," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 133-134.

Ashkin, A. and Dziedzic, J. M., "Optical Levitation of Liquid Drops by Radiation Pressure," Science 187, 1073-1075 (March 1975).

Brown, D. J., "Skylark Sounding Rocket Facilities for Materials Science Experiments," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 399-404.

Cambon, G., "Gradient Heating Facility on Board of Spacelab," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 135-136.

Eyer, A. and Zimmerman, H., "Flussig-und Gaszonenkristallosation unter Schwerelosigkeit," Report issued by the German Ministry of Research and Technology, Nr. FBW 77-12 (1977).

Eyer, A., Nitsche, R., and Zimmerman, H., "Zonenzuchtung von Kristallen mittels optischer Heizung," Status-Seminar Spacelab-Nutzung, Bad Kissingen (1976). Report issued by the Geran Ministry of Research and Technology, ISBN 3-88135-038-1.

Eyer, A., Zimmerman, H., and Nitsche, R., "A Radiation Furnace for Zone-Crystallization Experiments in Space," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 6-8, 1976, ESA SP-114, pp. 241-244.

Feret, J. M. and Mazelsky, R., "Skylab Furnace System Provides Precise Thermal Environment for Materials Experiments," Westinghouse Engineer, November 1973, p. 174.

Franke, B., "Research and Technology under Weightlessness - Performance of Texus Hardware and Experimental Results," XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-147.

Gardy, K., "Process Chamber, Payload Element of the German Microgravity Mission D-1," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979. ESA SP-142, pp. 163-166.

Geisel, J. E. and Franke, B., "Experiment Modules and Facilities in TEXUS I and II," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 177-188.

Geisel, J. E. and Hugo, F., "Functional Performance of the Isothermal Heating Facility for the Material Science Double Rack," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 167-176.

Grasser, R. and Scharmann, A.," Detailed Description of a Space Processing Furnace," Proceedings of Symposium on Processing and Manufacturing in Space, Frascati, Italy, March 1974, ESRO SP-101, pp. 327-335.

Kreeb, H., "Various Heating Facilities for the Shuttle/Spacelab Utilization Programme," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 201-202.

Lewis, G., "Apparatus, Techniques and Physical Parameters of Sounding Rocket Flight," Proceedings of Processing and Manufacturing and Processing in Space, Frascati, Italy, March 1974, ESRO SP-101, pp. 335-338.

Lewis, G. and Watt, J. G., "A Preliminary Study of a General Purpose Floating Zone Electrophoresis Facility for Spacelab," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 167-174.

Lierke, E. G., "Hardware Development and Performance Tests for Acoustic Positioning Device," Second. Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 333-340.

Lierke, E. G., "Ultrasonic Positioning and Stirring," Proceedings of a Symposium on Processing and Manufacturing in Space, Frascati, Italy, July 1974, ESRO SP-101, pp. 303-310.

Lierke, E. G., Heide, W. M., Grobback, R., and Clancy, P. F., "Positioning and Mixing Instrumentation Employing Electrostatic and Acoustic Principles," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 149-158.

Lovoi, P. A. and Vardaman, W., "Engineering Evaluation of Existing Space Hardware for Utilization in Small-Contained Payloads," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 205-212.

Monti, R. and Napolitano, L. G., "The Italian Free Convection Experiment on Spacelab I - On Ground Experimental Investigations," Space in the Service of Man, 18th International Scientific Conference on Space, Rome, Italy, March 1978.

Vits, P. and Schawer, J., "Experiment Performance under Zero-G Using Small Self-Contained Payloads and other Automatic Equipment," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 403-410.

Zimmerman, P., "Accommodation of European Material Science Experiments into Spacelab Payloads," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 115-127.

General Studies and Surveys

Beck, R., Grunthaler, K. H., Sethna, D., Tschulen, R., and Winter, R., "Assessment of the Results of the Skylab Space Processing Experiments with Respect to Their Scientific-Technical Significance," Battelle Institute, Franskfurt-am-Main, Germany, Final Report, ESRO Contract SC/43/RQ, October 1974.

Berge, K. D. and Tegtmeier, A., "Spacelab - Europe's Participation in Manned Space Flight and its Long-Term Aspects," Vesterreichische Gesellschaft Fuer Weltnaumforschung and Elugkoerpertechnik and Deutsche Gesellschaft Fuer Luft and Raumfohrt, 6th Gemeinsame Jahrestagung, Innsbruck, Austria, September 1973.

Bewersdorff, A., "Survey of the Microgravity Program in the Federal Republic of Germany," 19th COSPAR Plenary Meeting, Philadelphia, PA, 1976, Paper D.1.2.

Ceronetti, G. and Rovera, G., "The Fluid Physics Module - A Contribution to Material Sciences and Physics in Space," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 137-148.

Changeart, F. J. and Cadars, J., "A New Container for Conditioning Space Experiments," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 189-200.

Collet, J., "ESA Spacelab Payload Planning," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 57-62.

Eyb, M. and Siemann, H., "A Service System for Material Science Experiments on Space Shuttle," Third Euro. Sym on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 159-162.

Faust, D., "Technological Experiments Exposed to Low Gravity During Sounding Rocket Flights - Project TEXUS," XXth Plenary COSPAR Meeting, Tel Aviv, Israel, June 7-18, 1977, pp. 529-532.

Faust, D. and Deserno, B., "Overview of the Future of the TEXUS Programe," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 411-414.

Faust, D. and Kiehne, N., "Spacelabnutzung-Abschlussberich Projekt TEXUS I," 1977.

Franke, B., "PAMIS: A European User Requirement Study," Processing and Manufacturing in Space Symposium, Frascati, Italy, March 1974, ESRO SP-101, pp. 137-154.

Franke, B. and Geisel, J. E., "TEXUS I and II Payload," 17th Aerospace Sciences Meeting, New Orleans, LA, January 1979, AIAA Paper

Fritts, E. and Byroade, A., "The Near-Term Potential of Manufacturing in Space," Third Euro. Sym. on Mat. Sci. in Space, Grenoble France, April 1979, ESA SP-142, pp. 427-431.

Grahn, S. and Stenmark, L., "Swedish Materials Science Experiment in the TEXUS I and II Rockets, - A Technical Description," Swedish Space Corporation, Solna, Sweden, August 1979.

Greger, G., "Overview of Materials Science Programme in Germany," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 6-8, 1976, ESA SP-114, pp. 73-80.

Greger, G., "Why and How is the Federal Government of Germany Promoting the Utilization of Spacelab?" Proc. R. Soc. Lond. Series A 361, 143-150 (1978).

Greger, G. and Blechert, G., "Strategies in Preparation of the Utilization of STS for Materials Research and Process Engineering," 15th Aerospace Sciences Meeting, Los Angeles CA, January 1977, AIAA Paper 77-247.

Greger, G., Strub, H., and Wagner, M., "The German Microgravity Program: Objectives and Present Status," XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-125.

Grunthaler, K. H. and Sethna, D., "Manufacturing of Composite Materials in Space," Proceedings of a Symposium on Processing and Manufacturing in Space, Frascati, Italy, 1974, ESRO SP-101, pp. 211-217.

Henrici, J., "European Industrial Cooperation in the Space Effort, Proceedings of the Eleventh Goddard Memorial Symposium, Washington, D.C., March 9, 1973, 9 pgs.

Huth, U., "Preparation of European Material Sciences Experiments under Microgravity Conditions," Ruimtevaart 17, 221-238 (October-December 1978).

Johnson, R. W., "The European Shuttle Payload Activity," Space Shuttle Payloads, Proceedings of the Symposium, Washington, D.C., December 1972, 13 pgs.

Knabe, W. and Eilers, D., "Low-Gravity Environment in Spacelab," presented at XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-152.

Kring, G., "Chemistry and Industrial Processing Engineering a Spacelab Payload Element," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, ESA SP-142.

Levy, M., "Review of European Space Projects After 1980, The Second Fifteen Years in Space," Proceedings of the Eleventh Goddard Memorial Symposium, Washington, D.C., March 1973, 8 pgs.

Malmejac, Y. "Overview of the Present Status of the European and American Rocket Activities in the Field of Materials Sciences", Workshop on Materials and Material Processing in Space, Bangalore, India, 24-29 Sept. 1979

Malmejac, Y., "The Proposed French Metallurgy Programme for Spacelab," Proc. R. Soc. Lond. Series A 361, 165-174 (1978).

Malmejac, Y., Bewersdorff, A., Da-Riva, I., and Napolitano, L., "Challenges nd Prospectives of Microgravity Research in Space," ESA Publication ESA BR-05, October 1981, 77 pgs.

Praizey, J. P. and Berthier, J., "Problemes Poses Par L'Integration D'Experiences de Science des Materiaux clans un Vehicule Spatial," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142,

Schawer, J., "Automatic Materials Processing Laboratory on a Palette," (in German) Deutsche Gelsellschaft fur Luft und Raumfahrt and Hermann-Oberth-Gesellschaft, Deutschewr Luft und Raumfahrt Kongress, Dermstadt, West Germany, September 1978, DGLR Paper 78-145.

Seibert, G., "Spacelab and Materials Processing Facilities and Experiments," J. Vac. Sci. Techn. 14, 1252-1257 (November/ December 1977).

Seibert, G., "Spacelab and Materials Processing Facilities and Experiments," Proc. R. Soc. Lond. Series A 361, 131-142 (1978).

Seibert, G., "Overview of Materials Sciences Activities in Europe-Experiments and Experiment Studies," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 63-74.

Seibert, G., "Review of European Space Processing Activities," Processing and Manufacturing in Space Symposium, Frascati, Italy, March 1974, ESRO SP-101, pp. 87-96.

Shapland, D. J., "Space Science Prepares to Take-Off - Skylab Configurations for Spaceborne Expeiments," New Scientist 6, (February 28, 1974), 3 pgs.

Shapland, D. J., "Shuttle and Spacelab Capabilities," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, 1976, ESA SP-114, pp. 3-18.

Strub, H. A., "Outlook," 16th Goddard Memorial Symposium, Washington, D.C., March 1978, AAA Paper 78-002.

Tegtmeier, A. and Franke, B., "Possibilities for Production in Space," Fourth DGLR Annual Meeting, Baden-Baden, Germany, October 11-13, 1971, 89 pgs.

Weiss, H., "Materials Behavior in Low Gravity Environment," Proc. R. Soc. Lond. Series A. 361, 157-164 (1978).

Weiss, H., "Materials Processing in Spacelab," J. Vac. Sci. Technol. 14, 1263-1268 (November-December 1977).

Wolf, H. S. and Malmejac, Y., "Microgravity Research in the Space Environment," ESA Bulletin, August 1980.

Zimmerman, P., "Space Processing Facilities - Evolution from Manned Operations to Automated Freeflying System," presented at XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-158.

C. SOVIET PROGRAM

Crystal Growth

Alad'yev, S. I. and Okhotin, A. S., "Crystal Growth from the Vapor Phase with an Inert Component Present," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 41-45.

Alad'yev, S.; Zaitchik, K. and Okhotin, A., "The Effect of the Stefan Convection on the Crystal Growth Rate From the Vapor-Gas Medium, Academy of Sciences, Space Research Institute, Moscow, USSR, 1978.

Alad'yev, S. I. and Okhotin, A. S., "Concentration Profile Formation in Growing Monocrystals From Melt", Academy of Sciences, Space Research Institute, Moscow, USSR, 1978.

Avduyevsky, V. S., Grishin, S. D., and Leskov, L. V., "Some Physical Aspects of Unidirectional Crystallization in Microgravity," presented at XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-129.

Barta, C., Trnka, J., Triska, A., Khrjapov, V. I., Okhotin, A. S., and Zubrickij, I. A., "Experiment Morava on Board Salyut 6," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 215-219.

Chernov, A. A., "Theory of the Stability of Face Forms of Crystals," Sov. Phys. Cryst. 16, 734-752 (January/February 1972).

Galazka, R. R., Okhotin, A. S., et al., "Experiment "Syrena, 1,2,3, - Space Processing of CdHgTe, CdHgSe and PbSeTe," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 47-53.

Galazka, R. R., Warminski, T., Bak, J., Auleytner, J., Dietl, T., Okhotin, A. S., Borovikova, R. P., and Zubritskii, I. A., "Directional Crystallization of CdHgTe in Microgravity Conditions," Institute of Physics, Polish Academy of Sciences, Warsaw, Poland and Institute of Space Research, Academy of Sciences USSR, Moscow, 1979.

Galazka, R. R., Warminski, T., Bak, J., Auleytner, J., Dietl, T., Okhotin, A. S., Borovikova, R. P., and Zubritskij, I. "Directional Crystallization of CdHgTe in Microgravity Conditions," J. Cryst. Growth 53, 397-408 (1981).

Khashimov, F. R., et al., "Structural and Physical Characteristics of InSb Single Crystals Grown under Near-Zero Gravity Conditions," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 9-16.

Markov, E. V., et al., "The Influence of Space Conditions on Directional Crystallization of Germanium and Its Properties," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 17-24.

Prikhod'ko, L. V. and Bagdasarov, K. S., "Infrared Absorption in Yttrium-Aluminum Garnet Crystals at High Temperatures," Sov. Phys. Cryst. 16, 715-716 (1972).

Turovskii, B. M., "Method of Determining the Radial Temperature Gradients on the Crystallization Front of Ingots Grown by the Czochralski Method," Soviet Phys. Cryst. 8, 621-623 (1964).

Zemskov, V. S., Kubasov, V. N., Belokurova, I. N., Titkov, A. N., Shulpina, I. L., Safavov, V. I., and Guseva, N. B., "Multiple Materials Melt in Germanium-Silicon Solid Solutions - Part of Experiment MA-150," Apollo-Soyuz Test Project Summary Science Report, Vol. I, 1977, pp. 539-553.

Zemskov, V. S., Shulpina, I. L., Titkov, A. N., Belokurova, I. N., Guseva, N. B., and Safavov, V. I., "Investigation of Germanium-Silicon-Antimony Solid-Solution Crystals Prepared in the Universal Furnace Experiment in the Apollo-Soyuz Program," Sov. Phys. Solid State 21, 576-583 (April 1979).

Metals, Alloys, and Composites

Berghezan, A., "Preparation of Alloys Under Space Conditions," Processings of a Symposium on Processing and Manufacturing in Space, Frascati, Italy, March 1974, ESRO SP-101, pp. 219-227.

Frantsevich, I. N., Dvernaikov, V. S., Pasichny, V. V., Shiganov, N. A., and Korunov, Iu. I., "Investigation of the Possibility of Using Radiant Solar Energy for Welding and Soldering of Materials," Akademiia Nauk Ukrainskoi, Kiev, USSR, Twenty-third International Congress, Vienna, Austria, October 1972.

Ignatjev, G. E., Okhotin, A. S., and Avramov, Yu. S., "Investigation of the Structure of [illegible] Solid Solutions Obtained in Different Gravity Conditions On-Board the Salyut 6 Station and in the Centrifuge," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 33-39.

Ivanov, L. I., Kubasov, V. N., Pimenov, V. N., Gurov, K. P., Denuna, E. V., Malkov, Yu. S., and Lazarenko, V. M., "Multiple Materials Melting Metals-Experiment MA-150," Apollo-Soyuz Test Project Summary Science Report, Vol. I, 1977, pp. 501-538.

Okhotin, A. S., Livanov, L. K., et al., "Influence of Force Field on Eutectic Structure of Alloys," Materials Processing in Space with Applications to Space Processing, Progress in Astronautics and Aeronautics, Vol. 52, 1977, p. 455.

Paton, B. E., "The Special Features of the Procedure and Equipment for Electron Beam Welding and Cutting Under Space Conditions," Automaticheskaia Svarka 3, 33-38 (February 1962).

Savitsky, E. M. and Torchinova, R. S., "Space Solidification Experiment on Gd_3Co Compound," presented at XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-149.

Zemskov, V. S., "Segregation of Alloy Components Due to Barometric Molecular Diffusion in Potential Fields of Gravitational and Centrifugal Forces," Sov. Phys. Dokl. 22, 170-172 (March 1977).

Zemskov, V. S., Belokurova, I. N., Babarenko, A. A., Savytchev, V. V., and Bogdanova, N. F., "Solidification of Copper and Silver in Near Zero-G Experiments," presented at XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-144.

Gogosov, V. V., Zinov'ev, E. V., and Neletova, V. A., "Hydrodynamics of Ferrofluid Seals in Microgravity," presented at XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-137.

Gurevich, I. G., Kondrashov, N. G., Zhuk, I. P., "Non-Stationary Heat and Mass Transfer," Academy of Sciences of the Belorussian SSR, Institute of Heat and Mass Transfer, Israel Program for Scientific Translation, Jerusalem, Israel, 1967, 163 pgs.

Khamadov, A., "Investigation of Heat and Mass Transfer in Evaporation Under Conditions of Free Convection - In a Solar Heat Engine," Akademiia Nank Teukmenoskii SSR, Fiziko-Technicheskii Institute, 1974, 4 pgs.

Korovin, V. M., "Hydrodynamics During Melting of an Electroconductive Sample by Microgravity Conditions under Contactless Positioning by Electromagnetic Forces," presented at XXXII IAF Congress, Rome, Italy, September 6-12, 1981, Preprint 81-146.

Kopachevskii, N. D., "Small Oscillations of an Ideal Liquid in a Vessel Under Close-to-Weightlessness Conditions," Introduction to the Dynamics of Fluid-Containing Bodies under Conditions of Weightlessness (N. N. Moiseev, ed.), 1968.

Liubin, L. and Povitskii, A. S., "Effect of Oscillations on Transfer Processes under Conditions of Weightlessness," Kosmicheskie Issledovaniaa 5, 921-929 (December 1967).

Liubin, L. and Povitskii, A. S., "Certain Features of the Motion of a Fluid under Weightlessness Conditions," 17th IAF Congress, Madrid, Spain, April 1967, 12 pgs.

Liubin, L. and Povitskii, A. S., "Emptying and Filling Vessels in Conditions of Weightlessness," Planet. & Space Sci. 11, 1343-1358 (November 1963).

Nikolov, S., "Effect of Low-Frequency Ultrasound on Electrophoretic Properties and Thermosensitivity of Human Serum Proteins," Buill. Eksper. Bio. Med. 68, 58-60 (September 1969).

Polezhaev, V. I., "Convective Processes at Low Gravity," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 25-31.

Povitskii, A. S. and Liubin, L., "Fundamentals of the Dynamics and Heat and Mass Transfer of Fluids under Conditions of Weightlessness," Izdatel Stvo Mashinostroenie 1972, 252 pgs.

Shulkeykin, V. V., "Space of the Surface of a Liquid in Process of Losing its Weightlessness," Academiia Nank SSR Doklady 47, (November 1962), 10 pgs.

Vaulina, E. N., Palmbakh, L. R., Antipov, V. V., Kostina, L. N., Anikeeva, I. D., Zharikova, G. G., annd Kastakina, T. B., "Biological Investigation on the Orbital Station 'Salyut 5'," USSR Academy of Sciences, Moscow, 1978.

Experimental Facilities

Paton, B. E., Dudko, D. A., Bernadskii, V. N., Stesin, V. V., Lapchinskii, V. F., Zagrebel'ny, A. A., and Tsygankov, O. S., "Test Stands for Studying Technological Processes Under Simulated Space Conditions," 24th IAF Congress, Baku, Azerbaidzhan, USSR, October 7-13, 1973, 12 pgs.

General Studies and Surveys

Avdujevsky, V. S., Grishin, S., and Saviachev, V., "Technological Experiments on Board Salyut-5," 28th IAF Congress, Prague, Czechoslovakia, 1977.

Barta, C., Triska, A., and Okhotin, A. S., "Czechoslovak Preliminary Program of Material Research in Space," Third Euro. Sym. on Mat. Sci. in Space, Grenoble, France, April 1979, ESA SP-142, pp. 213-214.

Berghezan, A., Review of Composite Materials in Space," Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 1976, ESA SP-114, pp. 351-363.

Ganiev, R. F., Laptchinsky, V. F., and Okhotin, A. S., "Possible Application of Controlled Processes in Space Technology," 19th COSPAR Plenary Meeting, Philadelphia, PA, 1976, Paper D.3.3.

Kukhtenko, A. I., Merkueov, V. I., Samoilenko, Iu. I., and Ladikov-Roev, Iu. R., "Distributed Automatic Control of Technological Processes Under Weightless Conditions," 24th IAF Congress, Baku, Azerbaidzhan, USSR, October 7-13, 1973, 24 pgs.

Okhotin, A. S., Laptchinsky, V. F., et al., "Some Results of Studies in Space Technology in the USSR," 19th COSPAR Plenary Meeting, Phildelphia, PA, 1976.

Paton, B. E., "The Problems of Space Technology and their Influence on Science and Technics," 24th IAF Congress, Baku, Azerbaidzhan, USSR, October 1973, 17 pgs.

Petrov, B. N., Orbital Stations and the Study of Earth from Space, Joint Publications Research Service, Arlington, VA, Contractor Report No. JPRS-59650, July 1973.

Rich, V., "Polish Science Writers Go Too Far," Nature 280, (July 1979).

D. JAPANESE PROGRAM

Crystal Growth

Araki, T., Yamagata, T., and Hoshimoto, K., "Directional Solidification of Eutectic Superalloys," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Araki, T., Tachikawa, K., Matsuo, S., Togano, K., and Wada, H., "Casting of Superconducting Filamentary Composite Materials," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Araki, T., Hoshimoto, K., and Yamagata, T., "Diffusion in Liquid State and Solidification of Binary Systems," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Araki, T., Nakatani, I., Nishida, I., Kiyosawa, T., Takahashi, S., Koguchi, N., and Masumoto, K., "Growth of Semiconducting Compound Single Crystals by Floating Zone Method," presented at Materials Processing in Space Symposium: Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Hamakawa, Y., Nishino, T., and Okamoto, H., "Fabrication of Si-As-Te: NI Ternary Amorphous Semiconductor in the Microgravity Environment in Space," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Miyata, Y. and Suzuki, T., "Influence of the Gravitational Force on the Stability of a Liquid-Solid Interface," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Miyazima, T., Namba, S., Iwai, S., and Segawa, Y., "Growth of PbSnTe Crystal by Travelling-Zone Method in Low Gravity," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Ohno, A. and Motegi, T., "Solidification of Eutectic System Alloys in Space," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Shindo, I. and Sugitani, Y., "Applications of the Floating Zone Technique in Phase Equilibria Study and in Single Crystal Growth under Microgravity Conditions," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Sugano, T., Nishinaha, T., Katoda, T., Saito, O., Koshiga, F., Hattori, K., and Chikawa, J., "Growth of Si Spherical Crystals and the Surface Oxidation," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Takahara, K., Yoshii, S., Igarashi, M., Terada, A., and Muhikami, O., "Fabrication Experiment of Superconductive Alloys in Space," presented at Materials Processing in Space: Experimental Space Scientist Congress, Tokyo Japan, June 23-24, 1980.

Takahara, K., Suemune, Y., Sugii, K., and Kinoshita, K., "An Experiment in Growing Narrow Band-Gap Semiconductor PbSnTe Single Crystals in Space," presented at Materials Processing in Space: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Takahashi, T., Kamio, A., Murakami, T., Sato, T., Tezuka, H., Tanigawa, S., Okuda, S., Okazaki, M., and Fujikawa, T., "Study on Solidification of Immiscible Alloy," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Metals, Alloys, and Composites

Araki, T., Takahashi, S., and Ikeno, S., "Preparation of N-base Dispersion Strengthened Alloys," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Araki, T., Aritimi, N., Gunji, K., and Dan, T., "Formation Mechanism of Deoxidation Products in Iron Ingot Deoxidized with Two or Three Elements," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Ishikawa, T., Teranishi, H., and Hayase, T., "Preparation of SiC Fiber Reinforced Metal Composite Materials," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Kitada, M., Ichiyama, N., and Nishiyama, K., "Fabrication Study of High Damping Aluminum Alloys," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Okada, K., Takahashi, N., and Yoshida, M., "Development of New Selflubricating Metal-Base Composite Materials for Oilless Bearing," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Umekawa, S., Suzuki, T., Nunomura, S., Wakashima, K., Higo, Y., Mishima, Y., and Goto, T., "Fabrication of Very Low Density High Stiffness Metallic Composites With Foamy Hybrid Structures," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Watanable, E. S., Litazawa, K., Kotake, S., Terada, Y., Tsurida, T., Maeda, M., and Mohri, M., "Production of Blowhole Dispersed Cast Steels Solidified Under Low Gravity," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Yamaguchi, K., Sawaoka, A., Eto, T., Saito, M., and Kanbayashi, A., "Preparation of High Furnace Toughness Alumina Composite Under Microgravity Environment," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Fluids, Transports, and Chemical Processes

Abe, A., "A Simulation of the Phase Equilibria for Mixtures of Rodlike Molecules," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Chihara, H., Fujiyama, T., and Atake, T., "Study of Critical Phenomena of Binary Liquid Mixtures," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Kawasaki, T., Yamanka, T., Mori, H., Saito, M., and Kamimura, H., "The Stability of a Rotating Fluid Driven through a Rotating Liquid-Solid Interface," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Kohara, S., "Measurement of Interface Energy," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Kohara, S., "Study on the Mechanism of Liquid Phase Sintering," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Sato, A., Sasaki, S., Ozawa, K., Kumei, Y., Noda, M., and Miyamoto, H., "Rearrangement of Intermediate Filaments and Microfilaments in Mammalian Cells in Culture," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Sezaki, K., Enya, S., Yamada, R., Sato, S., Moriola, M., Ochiai, J., Tanasawa, I., and Maekawa, T., "Heat Transfer under Marangoni Effect Induced Convection," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Takenaka, Y., Nio, S., and Imagawa, K., "Observation of Liquid/Hydrogen Behavior under Microgravity," presented at Materials Processing in Space: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Glasses and Ceramics

Kawasaki, T., Godai, T., Narasaki, T., Mori, H., Shimizu, M., Matsuzaki, R., Yamamoto, Y., Tanemura, T., Fujiwara, T., Ogiwara, S., Yoshihara, S., and Ito, K., "Study of Bubble Behavior in Weightlessness - Effects of Temperature Gradient, Microgravity and Ultrasonic Wave Field," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Moriya, Y., Komiyama, T., and Hayakwa, J., "Preparation of Optical Materials Used in Non-visible Region," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Sezaki, K., Emya, S., Yamada, R., Ikegami, Y., and Morioka, M., "Firing Techniques of Glasses in Space," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Soga, N., Ota, R., Hanada, T., Hirao, K., and Kodama, H., "Density and Expansivity of Glass at High Temperatures," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Takuke, S., Maki, H., Kumagai, Y., Ueda, S., Satomi, E., and Nishimura, T., "Polymer Composites with Inorganic Fillers," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Ultrahigh Vacuum and Containerless Processing Technologies

Araki, T., Irie, H., Uda, M., Kawabe, Y., Fujita, M., Ohno, S., and Tsukamoto, S., "Electron Beam Wleding Phenomena and Improvement of Electron Beam Welded Joint," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Kaneko, H., Homma, M., Kawakami, M., Sezaki, K., and Onoue, M., "Experiment on Production of Highly Efficient R-Co Magnets," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Kawasaki, T., Nishimura, M., and Miyakawa, Y., "Effect of Space Environment on Friction and Wear of Several Materials," presented at Materials Processing in Space: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Kawasaki, T., Shimizu, M., Niioka, T., Godai, T., Mitani, T., Ito, K., Tanemura, T., and Fujiwara, T., "Effects of Space Storage on the Characteristics of Composite Solid Propellants," presented at Materials Processing in Space: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Kawasaki, T., Nagasu, H., Yamanaka, T., Okamoto, O., Saito, M., and Kamimura, H., "Drop Dynamics in Space and Interference with Acoustic Field," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Kimura, S., Sawaoka, A., Yasuda, E., and Kondo, K., "Formation of High Temperature Materials by CVD Method Under Microgravity Condition," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Sasaki, Y., Ohsumi, M., Kono, M., Sakamoto, A., Hayakawa, Y., and Hasegawa, H., "Electron Beam Welding Under Zero-Gravity Conditions," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Wada, N., Kato, M., Kumazawa, M., and Uyeda, R., "Gas-Evaporation in Low-Gravity Field," presented at Materials Processing in Space: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Experimental Facilities

Kawasaki, T., Suzuki, T., Otsuki, M., and Enkyo, S., "Preformance Tests for the Accelerometers Under Weightless Field," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

Nakanishi, H., Iida, C., Takiyama, T., Enya, S., Kisaragi, T., Ishida, M., and Suzuki, H., "Surface Tension Propellant Acquisition Device," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

General Studies and Surveys

Morita, A., Kosaka, K., and Ishikura, S., "Space Fabrication of Satellite Structural Elements," presented at Materials Processing in Space Symposium: Experimental Space Scientist Congress, Tokyo, Japan, June 23-24, 1980.

II. PATENTS

Patents

Barmatz, M. and Wang, T. G., "Containerless Processing Chamber for Very High Temperatures and Temperature Changes," Patent pending.

Elleman, D. D., Croonquist, A. D., and Wang, T. G., "Complementary Acoustic Phase Modulation for Control of Levitated Samples," Patent pending.

Elleman, D. D. and Wang, T. G., "Acoustic Energy Shaping of Materials in the Plastic State," U.S. Patent #4,052,181, Issued October 4, 1977.

Kanber, H., Rudnick, I., and Wang, T. G., "Torque Produced by Phase Displaced Two Source Acoustic Energy Applied to a Rotor," U.S. Patent #4,139,806, Issued February 13, 1979.

Kendall, J. M., "Drop Tower with no Aerodynamic Drag," Patent pending.

Kendall, J. M., Elleman, D. D., and Wang, T. G., "Prefilled Fusion Target Fabrication Apparatus and Method Therefor," Patent pending.

Kornfeld, D. M., Vanderhoff, J. W., and Micale, F. J., "Process for Preparation of Large Particle Monodisperse Latexes," U.S. Patent #4,247,434, Issued January 27, 1981.

Lacy, L. L., Robinson, M. B., and Nisen, D. B., "Containerless High Temperature Calorimeter Apparatus," U.S. Patent #4,248,038, Issued February 3, 1981.

Lee, M. and Wang, T. G., "Contactless Coating Facility," Patent pending.

Oran, W. A., Berge, L. H., Reiss, D. A., and Johnson, J. L., "Method and Apparatus for Shaping and Enhancing Acoustical Levitation Forces," U.S. Patent #4,218,921, Issued August 26, 1980.

Saffren, M. M., Elleman, D. D., and Wang, T. G., "Acoustical Position Chamber," U.S. Patent #3,882,732, Issued May 13, 1975.

Trinh, E. and Wang, T. G., "Method and Means for In-Situ Dynamic Measurement of Chemical Reactions," Patent pending.

Walter, H. U. and Snyder, R. S., "Method of Crystallization," U.S. Patent #4,046,617, Issued September 6, 1977.

Wang, T. G., "Method and Apparatus for Nuclear and Chemical Waste Disposal," Patent pending.

Wang, T. G., Saffren, M. M., and Elleman, D. D., "Material Suspension Within an Acoustically Excited Resonant Chamber," U.S. Patent #3,882,732, Issued May 13, 1975.

Wang, T. G., Elleman, D. D., and Kendall, J. M., "Process for Producing Extremely Precise Hollow Spheres," Patent pending.

Wang, T. G., Leung, E., and Lee, C. P., "Acoustic Position Servo System," Patent pending.

APPENDIX A

REPORTS AND MISCELLANEOUS COLLECTED PAPERS

(NO AUTHOR STATED)

Space Processing Applications Bibliography - Preliminary Draft, Also Crystal Growth and Fluids Experiments Bibliography.

Science Payload II Test Project Report, NASA/MSFC.

A New Horizon for Industry - Commercial Materials Processing in Space (Includes Experiments for Shuttle), NASA/MSFC.

Materials Processing in Space - Small Equipment Apparatus, NASA/MSFC, CMPS 300, Preliminary Report.

"Induction Furnaces," Metals Handbook, Vol. 5, p. 348.

Materials Processing in Space: A Marketing Strategy, Harvard Business School, Harvard Univ., Boston, MA, NAS8-33446.

Systems Planning Corporation - Summary of Correspondence and Meetings - MPS.

Experimental Development of Processes to Produce Homogenized Alloys of Immiscible Metals, TRW, NAS8-27805, Final Report, Phase III, 50 pgs.

Materials Processing in Space, Summary of Fluid and Chemical Processing Technology Applicable to Bioprocessing, NASA/MSFC, CMPS-215.

Summary of Correspondence and Minutes of Meetings Between SPC and Contacted Authorities and Informational Brochure, Application Analysis of Materials Processing in Space (Addendum to Report 390), NAS8-32832.

New Materials and New Fabrication Techniques for Optical Fibers, Electro-Optical Systems Design, p. 8.

Zero-G Liquid Studies: Critical State and Drop Dynamics," Electro-Optical Systems, Pasadena, CA, NAS8-21012, Quarterly Progress Report, August 15, 1967, 25 pgs.

'Zero-G Manufacturing Process Concepts," General Dynamics, July 1968.

"Manufacturing Technology Unique to Zero Gravity Environment," NASA/MSFC Conference, NASA TM-X-62504, November 1968, 234 pgs.

Processes for Space Manufacturing - Definition of Criteria for Process Feasibility and Effectiveness, General Dynamics, DCN-1-X- 30-35387, June 1969, 48 pgs.

Spherical Forming and Composite Casting in Zero-G, Arthur D. Little, Interim Report, NAS8-21402, July 20, 1969, 72 pgs.

Materials Processing and Manufacturing in Space (Proposed Development Plan), NASA/MSFC, July 1969, 34 pgs.

Space Processing and Manufacturing Meeting, NASA/MSFC Conference, NASA TM-X-62560, October 21, 1969, 546 pgs.

Sphere Forming and Composite Casting in Zero-G, Arthur D. Little, Final Report, NAS8-21402, January 1970, 122 pgs.

"Preliminary Failure Effect Analysis for Experiment M512-Materials Processing in Space and Experiment M479 - Zero Gravity Flammability Malfunction Analysis Section Astronautics Lab, MSFC, March 1970.

Space Processing and Manufacturing, NASA TM-X-53993, February 5, 1970, 538 pgs.

"Unique Manufacturing Processes in Space Environment," Seventh Space Congress, NASA TM-X-67178, Cocoa Beach, FL, April 1970.

Apollo 14 Flight Data, NASA, January 31, 1971, prepared by Data Processing Branch Computation and Analysis Division.

Holography and Optical Filtering, Conference held at MSFC, May 1971, NASA SP-299, 202 pgs.

Research Study on Composite Castings, Arthur D. Little, Final Report, May 26, 1971, 69 pgs.

Technical Summary Report to Advanced Research Projects Agency on Materials Preparation and Characterization Research (July 1, 1971- December 31, 1971), Materials Research Lab, Penn State University.

Apollo 14 Composite Casting Demonstration, Final Report, Arthur D. Little, Cambridge, MA, NASA-CR-61639, August 20, 1971.

Preliminary Requirement Review - Electromagnetic Levitation System Experiment Facility Description - For Use with M512 Materials Processing Facility on Skylab, GE, February 1972.

Skylab - Materials Processing in Space - Experiments M512, M551, M552, M553, M554, and M555, May 1972.

"Proceedings of the Space Shuttle Sortie Workshop, Vol. 2, Working Group Reports," NASA TM-X-68842, August 1972, 561 pgs.

Engineering Development and Test Plan for Multipurpose Electric Furnace System M-518, Westinghouse, NAS8-28271, August 1972, 31 pgs.

Payload Analysis for Space Shuttle Applications, Vol. 4, Final Report, NASA CR-130025, October 15, 1972, 25 pgs.

Sortie Laboratory Preliminary Definition Study, Vols. 1-3, November 1972, 500 pgs.

Data Package for Cartridges for the Multipurpose Electric Furnace System M-518, NAS8-28271, Vol. II, November 1972, 350 pgs.

Drawing Package for Multipurpose Electric Furnace System M-518, NAS8-28271, Westinghouse, November 1972, 200 pgs.

Sortie Laboratory Preliminary Definition Study, Requirements and Concepts Report, Messerschmitt-Boelkow-Blohm GmBh, Ottobrumm, Germany, Contractor No. MBB-LS-72-04, November 15, 1972, 707 pgs.

"Materials Science and Manufacturing in Space," Skylab News Reference, NASA Office of Public Affairs, Washington, D.C., March 1973, 55 pgs.

Directionally Solidified Composites: Known also as In Situ Composites or Directionally Solidified Eutectics, NMAB Ad Hoc Committee on Directional Solidification, Final Report NMAB-301, April 1973.

Final Report of the Space Shuttle Payload Planning Working Groups, Executive Summaries, NASA/GSFC, May 1973, 42 pgs.

Skylab Experiments, Volume 3, Materials Science, NASA, May 1973, 49 pgs.

Low Cost Payload Design Concepts Study - Volumes 1 and 2, NAS8-28960, June 1973.

Shuttle Orbital Applications/Requirements (SOAR) Supplementary Tasks, NASA CR-124431, September 1973, 365 pgs.

Sortie Laboratory, Phase B, Technical Summary - Design and Operational Requirements, NASA TM-X-69942, November 1973, 200 pgs.

Seventh Conference on Space Simulation, Los Angeles, CA, November 12-14, 1973, NASA SP-336, 953 pgs.

Preliminary Project Plan-Sounding Rocket Program for Space Processing Experiment Development Phase, NASA/MSFC, February 21, 1974.

Proceedings of Symposium on Processing and Manufacturing in Space, Frascati, Italy, March 25-27, 1974, ESRO SP-101.

"Space Processing as Related to Five Discipline Areas," For use by Academy of Engineering 1974 Summer Panel, Universities Space Research Association, Charlottesville, VA, NGR-47-102-3, April 15, 1974.

The Space Applications Program, NASA, May 1974, 300 pgs.

The Space Applications Program, Appendices, NASA, May 1974, 190 pgs.

Proceedings of the Third Space Processing Symposium: Skylab Results, April/May 1974, Huntsville, Al. (Abstracts)

Proceedings of the Third Space Processing Symposium: Skylab Results, Vol. I, Huntsville, AL, June 1974, M-74-5.

Proceedings of the Third Space Processing Symposium: Skylab Results, Vol. II, Huntsville, AL, June 1974, M-74-5.

European Views on Processing and Manufacturing in Space, ESRO-CERS Applications Summer Study, U.S. National Academy of Engineering, June 1974.

Spacelab - An Orbital Laboratory for Science Applications and Technology, European Contributions to Applications Summer Study, National Academy of Engineering, Snowmass, CO, June 30-July 13, 1974.

MSFC Skylab Corollary Experiments, Skylab Program Office, NASA TM-X-64809, July 1974.

MSFC Skylab Student Project Report, Skylab Program Office, NASA TM-X-64866, August 1974.

Feasibility Study for the Manufacture of Pharmaceuticals Immunological and Viral Agents," Arthur D. Little, NAS8-29874, August 1974.

Proceedings of the International Colloquium on Drops and Bubbles, CIT & JPL, August 28-30, 1974, Vols. 1-2.

"Materials Processing Experiments," MSFC Skylab Corollary Experiment Systems Mission Evaluation Report, Section V, NASA TM-X-64820, September 1974.

"Space Processing Rocket Experiment Project," NASA, Announcement of Opportunity No. OA-74-1, November 1974.

"Materials Processing," MSFC Integrated Experiments Preliminary Report, Section III D, NASA TM-X-64881, November 1974, 145 pgs.

The Establishment of an Independent Institute as an Integral Part of the NASA Program in the Effect of the Space Environment on Materials and Processing, Final Report, submitted by USRA, December 13, 1974.

Automated Space Processing Payloads Study, Bendix Corp., NAS8-30741, January 1975.

Handbook for Space Processing Sounding Rockets Science Payloads, NASA/MSFC, Report No. M-EH-75-2, March 1975.

Processing Ceramics in Space," Issued by the Ceramics Division of ITT Research Institute, May 1975.

Feasibility Study of Commercial Space Manufacturing Task I Process Description and Rate, McDonnell Douglas, NAS8-31353, May 1975, 50 pgs.

Drop Tower Experiment Report (Performed December 12, 1974), NAS8-30797, May 28, 1975, 21 pgs.

Space Processing - Solidification in Low-G, An Overview, Grumman Aerospace Corporation, June 20, 1975, 33 pgs.

Feasibility Study of Commercial Manufacturing Task 1.3 and 1.4 Yield and Quality Improvement Analysis, July 1975, NAS8-31353, 43 pgs.

Feasibility Study of Commercial Space Manufacturing - First Program Status Briefing, McDonnell Douglas, August 1975, NAS8-31353, 166 pgs.

"Electrophoresis Experiment Design for Space," Beckman Instruments, NAS8-28474, Final Report, September 1975, 19 pgs.

Feasibility Study of Commercial Space Manufacturing, McDonnell Douglas, NAS8-31533, Final Report, December 20, 1975.

"NASA Seeks Industry Space Processors," Aviation Week & Space Tech., January 26, 1976, pp. 46-64.

Apollo-Soyuz Test Project - Preliminary Science Report, NASA TM-X58173, February 1976.

"Materials Sciences in Space," Proceedings of Second European Symposium on Material Sciences in Space, Frascati, Italy, April 6-8, 1976, ESA SP-114.

Abstracts of Papers Presented at Second Euro. Sym. on Mat. Sci. in Space, Frascati, Italy, April 6-8, 1976.

Auxiliary Payload Power System Study for Space Processing Applications Payloads, Preliminary Requirements Review, McDonnell-Douglas, NAS8-31361, July 1976.

Space Processing Payload Equipment, NAS8-31498, Final Performance Review, General Electric, August 1976.

Space Processing Applications Bibliography, MSFC, Preliminary Draft, August 1976, 167 pgs.

Space Processing Applications - STS/SPA Payloads, Project Planning Report, October 1976.

SPAR I Final Report, NASA-TM-X-3458, December 1976.

Space Processing Payload Equipment, NAS8-31495, Equipment Preliminary Design Update and Planning Data, GE, February 1977.

Apollo-Soyuz Test Project-Composite of MSFC Final Science Report, NASA TM-X-73360, January 1977, 472 pgs.

Feasibility Study of Commercial Space Manufacturing, McDonnell-Douglas Corporation, Phase II Final Report, Volume I, Executive Summary, NAS8-31353, January 15, 1977.

Feasibility Study of Commercial Space Manufacturing, McDonnell-Douglas, Phase II Final Report, Volume II, Technical Analysis, NAS8-31353, January 15, 1977.

Feasibility Study of Commercial Space Manufacturing, McDonnell-Douglas, Phase II Final Report, Volume III, Supporting Trade Studies, NAS8-31353, January 15, 1977.

SPA Special Emphasis Study, Third and Fourth Interactive Meeting, TRW, Redondo Beach, CA, February 24, 1977.

SPA Payload Equipment Integration Support Systems for Space Processing Applications Payloads, Fourth Working Group Meeting, McDonnell Douglas, NAS8-31361, February, 1977.

"The Utilization of Space Laboratories for Materials Research and Process Engineering as well as for Commercial Purposes within the Framework of the Federal Government's Space Programme," Bonn, July 1977.

Planning for Materials Processing in Space, Final Report of the NASA/ASEE Engineering Systems Design Summer Faculty Fellowship Program, UA, Tuscaloosa, AL, NGT-01-002-095, September 1977, 71 pgs.

SPAR II Final Report, NASA TM-78125, November 1977.

Feasibility Study of Commercial Space Manufacturing, McDonnell-Douglas, Phase III Pharmaceutical Products Final Report, Volume II, Technical Analysis, NAS8-31353, December 1977.

"Materials Processing in Space," Report of the Committee on Scientific and Technological Aspects of Materials Processing in Space of the Space Applications Board, Assembly of Engineering, National Research Council, published by National Academy of Sciences, 1978.

Spacelab-Nutzung Wekstofforschung und Verfahrenstechnik, Deutsche Gesellschaft fur Luft- und Raumfahrt e.V., Status Seminar 1977 des Bundesministeriums fur Forschung und Technologie, 1978.

SPAR III Final Report, NASA TM-78137, January 1978.

Biological Liquids Handling Procedures Study," Beckman Instruments, NAS8-32612, Final Report, February 1978, 35 pgs.

Translation on USSR Science and Technology Physical Sciences and Technology," U.S. Joint Publications Research Service, Report No. JPRS L/7713, April 12, 1978, 98 pgs.

"The Swedish Texus Experiment: A Technical Description and Some Preliminary Results," Proceedings of Esrange Symposium, Ajaccio, April 24-29, 1978.

SRB Materials and Processes Assessment from Laboratory and Ocean Environmental Tests, Materials and Processes Laboratory, NASA TM-78187, June 1978, 221 pgs.

Translations on USSR Science and Technology Physical Science and Technology, U.S. Joint Publications Research Service, Report No. JPRS L/7966, August 17, 1978, 107 pgs.

Translation on USSR Science and Technology Physical Sciences and Technology, No. 45, August 1978.

Technical Capabilities of Division of Materials Sciences," KMS Fusion, November 1978, 63 pgs.

Containerless High-Temperature Calorimeter, NASA Tech Briefs, 1979.

Design Study for Countercurrent Distribution (CCD) Studies, Beckman Instruments, NAS8-32086, Final Report, February 1979.

"The Lure of Space Development," Compressed Air Magazine, February 1979.

Analysis of Degassing Techniques to Support Vacuum Space Research Facility, McDonnell-Douglas, Vol. II, Summary of Present Technology and Procedures Used in the Aerospace Industry, NAS8-33155, March 7, 1979.

"Material Sciences in Space," Proceedings of Third European Symposium on Materials Sciences in Space, Grenoble, France, April 1979, ESA SP-142.

Analysis of Degassing Techniques to Support Space Vacuum Research Facility, McDonnell-Douglas, Executive Summary, Vol. IA, NAS8-33155, September 11, 1979.

Analysis of Degassing Techniques to Support Space Vacuum Research Facility, McDonnell-Douglas, Vol. III, Technical Results Task 1.2-Task 3.0, NAS8-33155, September 11, 1979.

Analysis of Degassing Techniques to Support Space Vacuum Research Facility, McDonnell-Douglas, Vol. V, Appendix, NAS8-33155, September 11, 1979.

Materials Processing Center, School of Engineering, MIT, Annual Report, 1980, 189 pgs.

System Feasibility of a Space Vacuum Research Facility - Wake Shield Demonstration, McDonnell-Douglas, Executive Summary, Vol. IB, NAS8-33155, January 1980.

Analysis of Degassing Techniques to Support Space Vacuum Research Facility, McDonnell-Douglas, Vol. IV, System Feasibility of a Space Research Facility Demonstration Program, NAS8-33155, January 22, 1980.

SPAR IV Final Report, NASA TM-78235, January 1980.

"The Space Race in Manufacturing," Science News, Vol. 17, February 16, 1980, p. 102.

Materials Experiment Carrier (MEC) Concepts Definition Study, MEC Space Processing Payloads, Processing Analysis and Preliminary Payload Requirements, NAS8-33688, February 29, 1980, 164 pgs.

"Investing in the Year 2000," The Washington Star, March 1980.

Thirty-First International Astronautical Federation Congress, Tokyo, Japan, September 21-28, 1980, Abstracts of papers.

STS Flight Assignment Baseline, STS Operations-NASA Headquarters December 15, 1980, 77 pgs.

Materials Processing in Space Small Experiment Apparatus, Preliminary Report, CMPS 300, 1981.

Materials Processing in Space Program Tasks, NASA TM-82443, 1981.

Erstarrungsfrontdynamik Workshop, Gieberei-Institut, Aachen, March 12-13, 1981, 186 pgs.

"The Industrialization of Space: Why Business is Wary," New York Times, March 22, 1981, Section 3.

Advanced MEA Study: A Conceptual Design and Analysis Study, Program Development, March 1981, 125 pgs.

"The Space Shuttle," Chemical Engineer, April 20, 1981.

Torroidal Ellipsoid Float Zone Processing System," TDC, NAS8-33785, May 1981, 36 pgs.

Invitation to Workshop on "Flussigkeitsgrenzflachen und Benetzung," to be held June 1981 at Battelle-Institut, Frankfurt, West Germany.

Draft of Status Report of Materials Processing in Space requested by Office of Management and Budget, June 19, 1981.

SPAR VI Final Report, NASA TM-82433, October 1981.

Spacelab Mission Three, NASA Directory, October 1981, 14 pgs.

Thirty-Second Congress of the International Astronautical Federation, September 6-12, 1981, Rome, Italy, Abstracts of papers.

Materials Research Society Meeting, Boston, MA, November 16-19, 1981, Abstracts of papers.

APPENDIX B

CROSS REFERENCE INDEX

Cross Reference Index

APPROVAL

MATERIALS PROCESSING IN SPACE BIBLIOGRAPHY

Compiled by Elizabeth Pentecost

The information in this report has been reviewed for technical content. Review of any information concerning Department of Defense or nuclear energy activities or programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

ROBERT J. NAUMANN
Chief, Space Processing Division

for J. E. KINGSBURY
Acting Director, Space Sciences Laboratory

☆U.S. GOVERNMENT PRINTING OFFICE 1982—546-071/180 REGION NO. 4