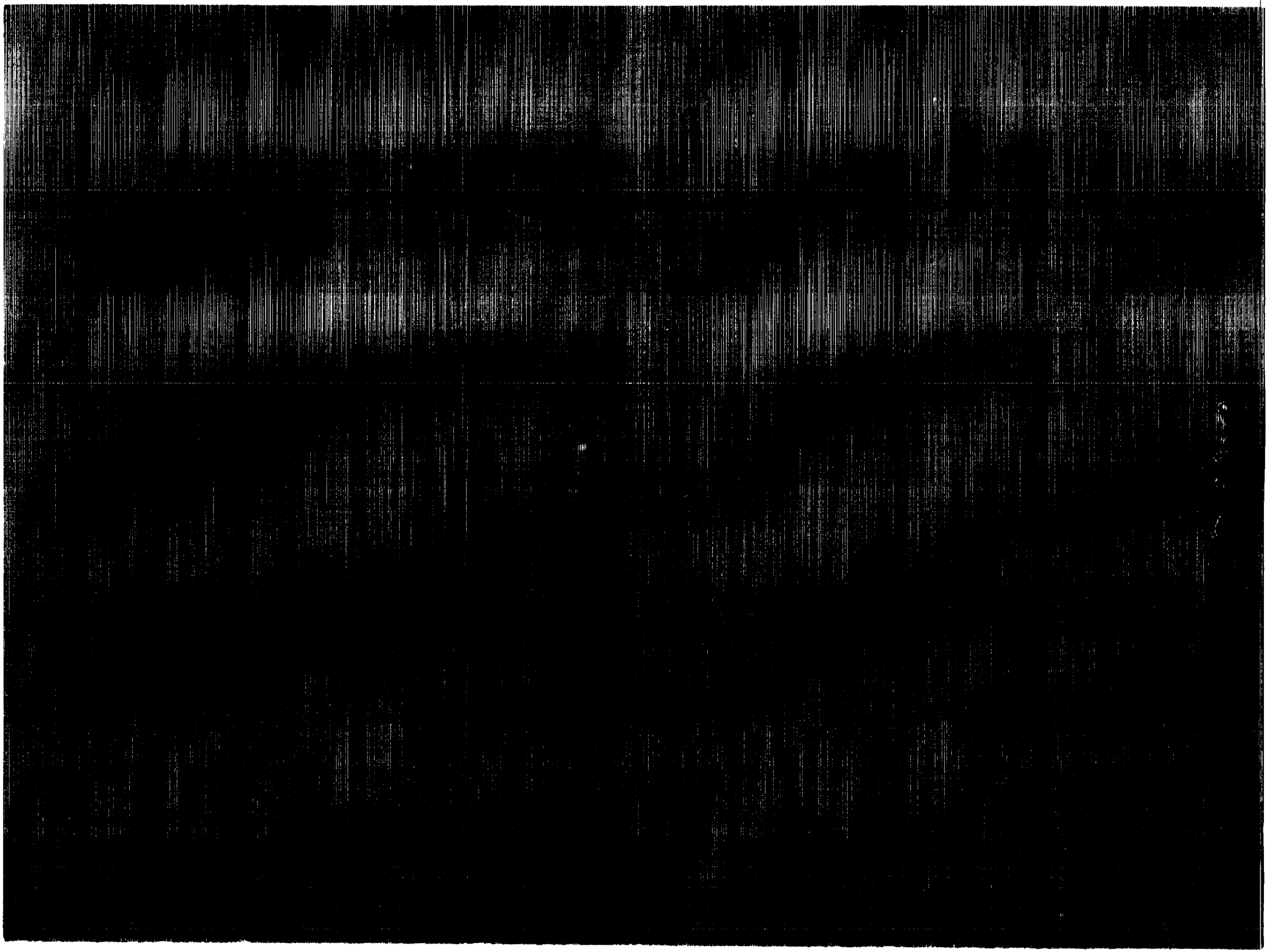
NASA Technical Memorandum 4192

Microgravity Science and Applications Bibliography

1989 Revision

MAY 1990



NASA Technical Memorandum 4192

Microgravity Science and Applications Bibliography

1989 Revision

NASA Office of Space Science and Applications
Washington, D.C.

National Aeronautics and
Space Administration
Office of Management
Scientific and Technical
Information Division

1990

CONTENTS

FOREWORD

This edition of the Microgravity Science and Applications (MSA) Bibliography is a comprehensive compilation of government reports, contractor reports, conference and symposia proceedings, and journal articles dealing with flight experiments utilizing a low-gravity environment to elucidate and control various processes, and with ground-based activities that provide supporting research. It encompasses literature published but not cited in the 1988 Revision, literature published during 1989, and literature either submitted for publication or in press.

All papers are on file and copies can be made available to scientists in the field on request to the bibliographer.

Any omissions that might have occurred are sincerely regretted. Investigators are encouraged to submit to the bibliographer, information on any work that was inadvertently omitted, or any new work, for inclusion in next year's edition of the Bibliography. All correspondence concerning corrections, additions, or deletions to the Microgravity Science and Applications Bibliography should be directed to: Ms. Elizabeth Pentecost, USRA, Suite 303, 600 Maryland Ave., SW, Washington, DC 20024.

The Microgravity Science and Applications Division wishes to thank the Universities Space Research Association (USRA) and in particular Ms. Elizabeth Pentecost, for her efforts in the compilation and publication of this report.

MICROGRAVITY SCIENCE AND APPLICATIONS PROGRAM

A. U.S. PROGRAM

Electronic Materials

Andrews, R. N., Szofran, F. R., and Lehoczky, S. L., "Growth and Characterization of $Hg_{1-x}Cd_xTe$ Alloys," J. Cryst. Growth, 1988 (in press).

Barber, P. G., Fripp, A. L., Debnam, W. J., "The Development of Procedures for the Direct Observation of the Location and Shape of the Melt-Solid Interface in the Bridgman Growth of Semiconductors," J. Cryst. Growth, 1989 (in press).

Bugajski, M., Ko, K. H., Lagowski, J., and Gatos, H. C., "Native Acceptor Levels in Ga-Rich GaAs," Appl. Phys., 1988 (in press).

Brown, R. A., Sackinger, P. A., Thomas, P. D., Derby, J. J., and Atherton, L. J., "Application of Large-Scale Simulation to Intelligent Materials Processing: Modelling of Czochralski Growth of Single Crystals," in *Interdisciplinary Issues in Materials Processing and Manufacturing* (S.K. Samanta, R. Komanduri, et. al., eds.), ASME, 1987, pp. 331-348.

Carlson, D. J. and Witt, A. F., "Determination of Free Charge Carrier Distribution and Micro-Segregation of Dopants in n-Type GaAs," J. Cryst. Growth 91, 239-243 (1988).

Carlson, D.J. and Witt, A. F., "Quantitative Optical Determination of Segregation in Doped Silicon: A Comparative Analysis with Spreading Resistance Measurements," J. Cryst. Growth, 1988 (in press).

Chait, A., and Korpela, S. A., "The Secondary Flow and its Stability for Natural Convection in a Tall Vertical Enclosure," J. Fluid Mech., 200, 1989.

Cobb, S. D., Andrews, R. N., Szofran, F. R., and Lehoczky, S. L., "Characterization of Directionally Solidified $Hg_{1-x}Zn_xSe$ Alloys," J. Cryst. Growth, 1988 (in press).

Derby, J. and Brown, R. A., "On the Quasisteady-State Assumption for Modeling Batchwise Czochralski Growth," J. Cryst. Growth 87, 251-260 (1988).

Duval, W. M. B., Jacqmin, D. A., "Mixing of Two Fluids Under Steady Microgravity Acceleration," in *Proceedings of 7th International PCH Conference*, MIT, Cambridge, MA, June 25-29, 1989 .

Garcia-Ybarra, P. and Rosner, D. E., "Thermophoretic Properties of Non-spherical Particles and Large Molecules," AIChE J. 35, 139-147 (1989).

Gokoglu, S. A., Kuczmarski, M., Tsui, P., and Chait, A., "Convection and Chemistry Effects in CVD: A 3D Analysis for Silicon Deposition," J. de Physique, 1989.

Gokoglu, S. A., Arnold, W. A., Tsui, P., and Chait, A., "A 2D Analysis for Convection Effects in a CVD Reactor Configured for Deposition on Single Fibers," *Proceedings of the 1990 ASME Winter Annual Meeting*, 1990 (accepted).

Hirsch, C-H. and Witt, A. F., "Analytical Approach to the Determination of Axial Temperature Gradients in Bridgman System," J. Cryst. Growth, 1989 (submitted).

Hirsch, C-H. and Witt, A. F., "Analytical Approach to the Determination of Growth Interface Mrophologies in Vertical Bridgman Geometry," J. Cryst. Growth, 1989 (submitted).

Huang, Y., Debnam, W. J., and Fripp, A. L., "Interface Shapes During Vertical Bridgman Growth of PbSnTe Crystals," J Cryst. Growth, 1989 (in press).

Jacqmin, D., and Duval, W. M. B., "Instabilities Caused by Oscillation, Accelerations Normal to a Viscous Fluid-Fluid Interface," J. Fluid Mech. 196, 495-511 (1988).

Kassemi, M., and Duval, W. M. B., "Effects of Gas and Surface Radiation on Crystal Growth from the Vapor Phase," in *Proceedings of 7th International PCH Conference*, MIT, Cambridge, MA, June 25-29, 1989

Kassemi, M., and Duval, W. M. B., "Interaction of Surface Radiation with Convection in Crystal Growth by Physical Vapor Transport," *27th Aerospace Sciences Meeting*, January 9-12, 1989, Reno, NV.

Kim, D., Adornato, P. M., and Brown, R. A., "Effect of Vertical Magnetic Field on Convection and Segregation in Vertical Bridgman Crystal Growth," J. Cryst. Growth 89, 339-356 (1988).

Kim, Y. J., and Kou, S., "Thermocapillary Convection in Zone Melting Crystal Growth-An Open-Boat Physical Simulation", J. Cryst. Growth, 1989 (in press).

Kim, D. and Brown, R. A., "Models of Convection and Segregation in Directional Solidification of HgCdTe," J. Cryst. Growth, 1988.

Koziol, J. K., The Effect of Electrolyte Convection on the Morphology of Silver Electrodeposits, Ph.D. thesis, Department of Materials Science and Engineering, MIT, September, 1989.

Krishnamurthy, S., Sher, A., Chen-A-B., and Fripp, A. L., "Nucleation Theory - An Improved Entropy," J Cryst. Growth, 1989 (in press).

Lan, C. W., Kim, Y. J., and Kou, S., "A Half-zone Study of Marangoni Convection in Floating-Zone Crystal Growth Under Microgravity", submitted for publication.

Lan, C. W., and Kou, S., "Thermocapillary Flow and Melt/Solid Interfaces in Floating-Zone Crystal Growth Under Microgravity", submitted for publication.

Lan, C. W., and Kou, S., "Thermocapillary Flow and Natural Convection in a Melt Column with an Unknown Melt/Solid Interface", submitted for publication.

Lehoczky, S. L., Szofran, F. R., Su, C-H., Cobb, S., and Andrews, R. N., "Crystal Growth of Solid Solution Systems by Directional Solidification," in *Proceedings of ASM International '87 Materials Congress*, 1988, in press.

Lin, C., Carlson, D. J., and Witt, A. F., "Growth Related Residual Strain in LEC GaAs," J. Cryst. Growth 92, 53-60 (1988).

Matthiesen, D. H., Wargo, M. J., Motakef, S., Carlson, D. J., Nakos, J. A., and Witt, A., "Dopant Segregation during Vertical Bridgman-Stockbarger Growth with Melt Stabilization by Strong Axial Magnetic Fields," J. Cryst. Growth 85, 557-560 (1987).

Matthiesen, D. H., Wargo, M. J., and Witt, A., "Melt Stabilization during Crystal Growth: A Comparative Analysis of the Effectiveness of Magnetic Fields and Reduced Gravity," J. Cryst. Growth, 1988 (in press).

Mennetrier, C. D., and Duval, W. M. B., "Coupled Effects of Conduction in the Crystal and Thermo-Solutal Convection in a Rectangular Inclined Enclosure, " Accepted for Presentation at the 28th AIAA Aerospace Sciences Meeting, Reno, NV, January 8-11, 1989 .

Palosz, W. and Wiedemeier, H., "Mass Flux, Crystal Composition, and Solid Solubility Studies of the $Hg_{1-x}Mn_xTe$-HgI_2 Vapor Transport System," J. Less-Common Metals, 1989 (in press).

Rosner, D. E., "Side-wall Gas 'Creep' and 'Thermal' Stress Convection in Microgravity Experiments on Film Growth by Vapor Transport," Phys. Fluids A., 1989.

Rosner, D. E. and Keyes, D. E., "Theoretical Studies in Support of the 3M Vapor Transport (PVTOS) Experiments," NASA CR-185122, July 1989.

Sha, Y. G. and Wiedemeier, H., "The Direct Determination of the Vacancy Concentration and P-T Phase Diagram of HgTe by Dynamic Mass Loss Measurements," J. Electronic Materials, 1989 (in press).

Singh, N. B., "Crystal Characterization by Birefringence Interferometry," J. Cryst. Growth 96, 114 (1989).

Singh, N. B., "On the Quality of Mercurous Chloride Crystals," Mat. Lett. 7, 397 (1989).

Singh, N. B., "Effect of Temperature Gradient on the Optical Quality of Mercurous Chloride Crystals," J. Cryst. Growth 96, 969 (1989).

Singh, N. B., "Design and Performance of Optical Activity Based Bragg Cells," Adv. Opt. Inf. Process 119, 936 (1989).

Singh, N. B., "Evaluation of Transport Conditions During Vapor Growth of Mercurous Chloride in l-g Conditions," J. Thermo-Phys. & Heat. Trans., 1989 (in press).

Singh, N. B., Glicksman, M. E., and Mazelsky, R., "Evaluation of Transport Conditions during PVT Growth: Mercurous Chloride System," Phys. Chem. Hydro. 11, 41-48 (1989).

Singh, N. B., Davies, D. K., Gottlieb, M., and Mazelsky, R., "On the Quality of Mercurous Chloride Crystal," J. Cryst. Growth, 1988 (submitted).

Taylor, R. E., Holland, L. R., and Crouch, R. K., "Thermal Diffusivity Measurements of Some Molten Semiconductors," High Temp. High Press., 1988 (in press).

Ungar, L. H. and Brown, R. A., "Finite Element Methods for Unsteady Solidification, Problems Arising in the Prediction of Morphological Structure," J. Sci. Comput., 1988 (in press).

van den Berg, L., "Mercuric Iodide Crystal Growth in Space," Nucl. Instrum. & Meth., 1989 (in press).

van den Berg, L., Skinner, N. L., and Ortale, C., "Charge Carrier Transport Properties of a Mercuric Iodide Crystal Grown in Space," in *Proceedings of IEEE 1989 Nuclear Science Symposium*, 1989 (in press).

Wiedemeier, H. and Palosz, W., "Mass Flux and Crystal Composition in the $Hg_{0.8}Cd_{0.2}Te$-HgI_2 Vapor Transport System," J. Cryst. Growth, 1989 (in press).

Yoo, H-D., Wilcox, W. R., Lal, R. B., and Trolinger, J. D., "Modelling the Growth of Triglycine Sulfate (TGS) Crystals in Spacelab-3," J. Cryst. Growth, submitted.

Young, G. W. and Chait, A., "Steady-State Thermal-Solutal Diffusion in a Float Zone," J. Cryst. Growth 96 (1989).

Metals, Alloys, and Composites

Andrews, J. B., Sandlin, A. C., and Curreri, P. A., "The Influence of Gravity Level and Interfacial Energies on Dispersion Forming Tendencies in Hypermonotectic Cu-Pb-Al Alloys," Met. Trans. 19A, 2645-2650 (1988).

Andrews, J. B., Briggs, C. J., and Robinson, M. B., "Containerless Low Gravity Processing of Immiscible Gold-Rhodium Alloys," in *Proceedings of VIII European Symposium on Materials and Fluid Sciences in Microgravity*, ESA, 1989 (in press).

Bayuzick, R.J., Hofmeister, W.H., and Robinson, M.B., "Some Aspects of Containerless Processing," *International Forum for the Scientific Utilization of Space Station*, ISAS, Sagamihara Japan (October 1989).

Bertero, G.B., Hofmeister, W.H., Bayuzick, R.J., and Robinson, M.B., "Splat Quenching of Undercooled Nb-Si Alloys With Nominal Composition of 25 Atomic Percent Silicon," in *Proceedings of Symposium on Materials Processing in Space,* ASM International, in press.

Bethin, J., Larson, D. J. and Dressler, B. S., "Orbital Processing of Aligned Magnetic Composites," in *Annual Report of Francis Bitter National Magnet Laboratory*, MIT Press, 1988 (in press).

Boettinger, W. J. and Perepezko, J. H., "Fundamentals of Rapid Solidification in Rapidly Solidified Crystallizing Alloys," (C. Adams, S. Das, and B. Kear, eds.), AIME, 1988 (in press).

Brattkus, K. and Davis, 5. H., "Cellular growth near absolute stability," Phys. Rev. B 38, 11452 (1988).

Brattkus, K. and Davis, S. H., "Directional solidification with heat losses," J. Cryst. Growth 91, 538 (1988).

Canright, D. R. and Davis, S. H., "Similarity solutions for phase-change problems," Met. Trans. 20A, 225 (1989).

Cezairliyan, A. and Miiller, A.P., "A Dynamic Technique for Thermophysical Measurements at High Temperatures in a Microgravity Environment," Int. J. Thermophysics, in press.

Chang, R.F. and Cezairliyan, A., "The Use of a Pyroelectric Detector for Rapid Measurements of Total Radiant Power," Int. J. Thermophysics, in press.

Chen, F. and Chen, C. F., "Experimental Investigation of Convective Stability in a Superposed Fluid and Porous Layer when Heated from Below," J. Fluid Mech. 207, 311-321 (1989).

Chen, C. F., "Double-Diffusive Convection and Its Effect Under Reduced Gravity," *Progress in Low-Gravity Fluid Dynamics and Transport Phenomena,* AIAA, Washington, D.C., 1990.

Chen, F. and Chen, C. F., "Convection in a Superposed Fluid and Porous Layer," J. Fluid Mech., 1988 (submitted).

Chopra, M. A., Glicksman, M. E., and Singh, N. B., "Dendritic Growth in Binary Alloys," Met. Trans. 19A, 3087-3096 (1988).

Chopra, M. A., Glicksman, M. E., and Singh, N. B., "Measurements of the Diffusion Coefficient of Acetone in Succinonitrile at its Melting Point," J. Cryst. Growth 92, 543-546 (1988).

Chopra, M. A., Laxmanan, V., and Burke, D. E., "Influence of an Applied Electric Field on the Solid-Liquid Interface Morphology in Pure Succinonitrile," J. Cryst. Growth, 1989 (in press).

Collings, E. W., McCoy, J. K., Rayment, J. J., and Markworth, A. J., "Splat Quenching of Freely Falling Drops by Impact on a Cold Substrate," J. Mat. Sci., 1988 (in press).

Collings, E. W. and Markworth, A. J., "Liquid-Drop Formation for Undercooling Experiments in Free Fall," Appl. Micro Techn., 1988 (submitted).

Davis, S. H., "Hydrodynamic interactions in directional solidification," J. Fluid Mech., 1989 (in press).

DeGroh, H. C., and Laxmanan, V., "Bulk Nucleation and Macrosegregation of Pb-Sn Alloys," Met. Trans., 1988 (submitted).

de Groh, H. C., and Laxmanan, V., "Macrosegregation in Undercooled Pb-Sn Eutectic Alloys," in *Solidification Processing of Eutectic Alloys* (D.M. Stefanescu, G.J. Abbaschian and R.J. Bayuzick, eds.), TMS, 1988, p. 229.

de Groh, H. C., "Macrosegregation and Nucleation in Undercooled Pb-Sn Alloys," Master Thesis, Case Western Reserve University, 1988, NASA TM 102023.

de Groh, H. C., and Probst, H. B., "Effects of Crucible Wetting During Solidification of Immiscible Pb-Zn Alloys," J. Spacecraft and Rockets 26, 476-479 (1989); also published as a NASA TM 101372, 1988.

de Groh, H. C., "Metallurgical Programs," NASA Tech Brief, in press.

Dhindaw, B. K., Stefanescu, D. M., Singh, A. K., and Curreri, P. A., "Directional Solidification of Cu-Pb and Bi-Ga Monotectic Alloys under Normal Gravity and during Parabolic Flight," Met. Trans. A, 1988 (in press); SSL Preprint Series 88-139, June 1988.

Ecker, A., Alexander, J.I.D., and Frazier, D. O., "Influence of Fluid Flow on Mass Transport in Solidifying Monotectic Melts," Met. Trans., 1988 (submitted).

Facemire, B. R. and Frazier, D. O., "Separation Processes in Monotectic Systems," Res. Mechan., 1988 (in press).

Fang, D. and Hellawell, A., "The Surface Morphology of Crystals Melting under Solutions of Different Densities," J. Cryst. Growth 92, 364-370 (1988).

Frazier, D. O. and Facemire, B. R., "Non-Ideality Near the Monotectic Composition of a Miscibility-Gap Type System: Succinonitrile-Water," Met. Trans., 1988 (submitted).

Frier, N., Shiohara, Y., and Russell, K.C., "Solidification Processing of Monotectic Alloy Metal Matrix Composites", in *Proceedings of 1988 Materials Research Society Symposium on Materials Processing*, 1989 (in press).

Ganesan, S. and Poirier, D. R., "Solute Redistribution in Dendritic Solidification with Diffusion in the Solid," J. Cryst. Growth, 1989 (in press).

Ganesan, S. and Poirier, D. R., "Conservation of Mass and Momentum for the Flow of Interdendritic Liquid during Solidification," Met. Trans. A (in press) .

R. M. German, S. Farooq and C. M. Kipphut, "Kinetics of Liquid Phase Sintering," Mat. Sci. & Engr. 105, 215-224 (1988).

Glicksman, M. E., Winsa, E., Hahn, R. C., Lograsso, T. A. Tirmizi, S. H., and Selleck, M. E., "A Facility for Precise Temperature Control Applications in Microgravity," Adv. Space Res. 8, 61-68 (1989).

Gray, R. T., Larrousse, M. F., and Wilcox, W. R., "Diffusional Decay of Striations," J. Cryst. Growth 92, 530-542 (1988).

Hallett, J., "On the Crystallization of Spheres and Shells," in *Proceedings of Third International Colloquium on Drops and Bubbles*, Monterey, CA, September 1988 (in press).

Hansen, G. P., Krishnan, B., Hauge, R. H., and Margrave, J. L., "A New Method to Determine Temperature and Emissivity of Liquid Metals at Elevated Temperatures," Trans. Met. Soc., 1988 (accepted).

Hardy, S. C. and Voorhees, P. W., "Ostwald Ripening in a System with a High Volume Fraction of Coarsening Phase," Met. Trans. 19A, 2713 (1988).

Heinrich, J., Felicelli, S., Nandapurkar, P., and Poirier, D. R., "Thermosolutal Convection During Dendritic Solidification," *27th Aerospace Sciences Meeting*, January, 1989, Reno, Nevada, Paper no. AIAA 89-0626.

Heinrich, J. C. and Felicelli, S., "Finite Element Simulation of Thermosolutal Convection in Vertical Solidification of a Binary Alloy," *Proceedings of the 7th International Conference on Numerical Methods in Flow Problems* (T.J. Chung and G.R. Kerr, eds.), University of Alabama in Huntsville Press, 1989, pp. 596-603.

Heinrich, J. C. and Felicelli, S., "Thermosolutal Convection during Dendritic Solidification of a Binary Alloy," *Finite Elements in Flow Problems* (T.J. Chung, ed.), Hemisphere Publishing Co., 1989 (in press).

Heinrich, J. C., Felicelli, S., Nandapurkar, P., and Poirier, D. R., "Thermosolutal Convection During Dendritic Solidification of Alloys, Part II: Nonlinear Convection," Met. Trans. 20B, 883 (1989).

Hellawell, A., "Channel Formation During Alloy Solidification," in *Indo-US Scientific Workshop on Solidification Processing*, (R. Trievedi, ed.), ONR, 1988 (in press).

Hobbs, H. H., "Metal Whiskers, A Convection Connection", in *Proceedings of World Materials Congress*, Chicago, September 1988 (in press).

Hofmeister, W.H., Robinson, M.B., and Bayuzick, R.J., "Non-Contact Temperature Measurement of a Falling Drop," Int. J. Thermophys. 10, 279 (1989).

Hofmeister, W. H., Bayuzick, R. J., and Robinson, M. B., "Experiments in Long Drop Tubes," in *Proceedings of Third International Colloquium on Drops and Bubbles,* AIP, 1988 (accepted).

Ilegbusi, O. J. and Szekely, J., "On the Flow Criteria for Suspending Solids in Electromagnetically-Stirred Melts," Met. Trans. B, 1987 (in press).

Ilegbusi, O. J. and Szekely, J., "Criteria for Particles Engulfment by an Electromagnetically-Stirred Melt," J. Colloid & Interface Sci., 1987 (in press).

Ilegbusi, O. J. and Szekely, J., "The Electromagnetic Stirring of Non-Newtonian Fluids," Trans. Iron & Steel Inst. Japan, 1987 (in press).

Kendall, J. M., "Experiments of Annular Liquid Jet Instability and on the Formation of Liquid Shells," Phys. Fluids, 1986 (in press).

Kipphut, C. M., Bose, A., Kishi, T., and German, R. M., "The Gravitational Effects on Liquid Phase Sintering," Advances in Powder Metallurgy, Volume 1, 1989 (in press).

Krishnan, S., Thermophysical and Optical Property Measurements of Electromagnetically Levitated Liquid Metals, Ph.D. Thesis, Rice University (1988).

Krishnan, S., Hansen, G. P., Hauge, R. H., and Margrave, J. L., "Spectral Emissivities and Optical Properties of Electromagnetically Levitated Liquid Metals as Functions of Temperature and Wavelength," High Temp. Sci., 1989 (in press).

Krishnan, S., Hauge, R. H., and Margrave, J. L., "Spectral Emissivities and Optical Constants of Electromagnetically Levitated Liquid Metals as Functions of Temperature anl Wavelength," in *Proceedings of NASA Noncontact Temperature Measurement Workshop Proceedings*, 1989, in press.

Krishnan, S., Schiffman, R. A., Nordine, P. C., and Weber, J.K.R., "Temperature Measurement in Containerless Experiments," *Symposium on Space Commericalization: Roles of Developing Countries*, Nashville, TN, March 5-10, 1989.

Larrousse, M. F. and Wilcox, W. R., "Interfacial Mass Transfer to a Cylinder Endwall during Spin-up/Spin-down," Chem. Eng. Sci. (in press).

Laxmanan, V., "Morphological Transitions during Rapid Solidification Processing: A Re-examination of Fundamental Validity of the Absolute Stability Concept of Mullins and Sekerka," Acta Met., 1988 (accepted).

Libera, M. R. and Shiohara, Y., "Analysis of Metastable BCC Phase Formation in Atomized Fe-Ni," in *Proceedings of MRS International Meeting on Advanced Materials*, May-June 1988 (in press).

Lowry, S. A., McCay. M. H., McCay, T. D., and Gray, P.A., "Surface Tension Measurements in Aqueous Ammonium Chloride in Air," J. Cryst. Growth 96, 774-776 (1989) .

MacDonald, R.A., "The Stability of a Current Carrying Hollow Liquid Metal Cylinder," J. Appl. Phys., submitted.

Markworth, A. J.,"A Kinematical Model fof Liquid-Drop Solidification due to Multiple Surface-Nucleation Events," Mat. Sci. Engr., 1988 (in press).

McCay, M. H. and McCay, T. D., "Measurement of Solutal Layers in Unidirectional Solidification," J. Thermophys. & Heat Transf. 2, 1988.

McCay, M. H. and McCay, T. D., "Processing in of Materials in Space," in *Proceedings of US-Indo Workshop on Solidification Processes,* 1988 (submitted).

McCay, T. D., McCay, M. H., Lowry, S. A., Smith, L. M. and Henderson, A. H., "Measurements of Diffusion Limited Solidification at Varying Gravity," AIAA Paper No. 89-1074, Buffalo, New York, June 1989.

McCay, T. D., McCay, M. H. and Gray, P. A., "Experimental Observation of Convective Breakdown of the Diffusion Layer During Alloy Solidification," Phys. Rev. Lett., 2060-2063 (1989).

McCay, M. H., McCay, T. D. and Smith, L. M., "Solidification Studies Using a Confocal Optical Signal Processor," J. Appl. Opt., submitted.

McCay, T. D., McCay., M. H., Lowry, S. A. and Smith, L. M., "Convective Instabilities During Directional Solidification," J. Thermophys. & Heat Transf. 3, 345-350 (1989).

McCay, T. D. and McCay, M. H., "An Inclusive Static Stability Criteria for Freckling in Directional Solidification of Metal Models and Alloys," Met. Trans. A, 1988 (submitted).

McClure, J. L. and Cezairliyan, A., "Measurement of the Heat of Fusion of Titanium and a Titanium Alloy (90Ti-6A1-4V) by a Microsecond Resolution Transient Technique," Int. J. Thermophysics, submitted.

McClure, J.L. and Cezairliyan, A., "Measurement of the Heat of Fusion of Molybdenum by a Microsecond-Resolution Transient Technique," Int. J. Thermophysics, in press.

McFadden, G. B., Coriell, S. R., Glicksman, M. E., and Selleck, M. E., "Instability of a Taylor-Couette Flow Interacting with a Crystal-Melt Interface," Physicochem. Hydrodyn. 11, 387 (1989).

Merchant, G. J. and Davis, S. H., "Morphological stagnation-point flow and steady streaming," J. Fluid Mech. 198, 543 (1988).

Merchant, G. J. and Davis, S. H., "Flow-induced morphological instabilities due to temporally-modulated stagnation-point flow," J. Cryst. Growth, 1988 (in press).

Merchant, G. J. and Davis, S. H., "Shallow cells in directional solidification," Phys. Rev. Lett. 63, 573 (1988).

Miller, A.P. and Cezairliyan, A., "A Dynamic Technique for Measuring Surface Tension at High Temperatures in a Microgravity Environment," Int. J. Thermophysics, in press.

Miyata, Y., Glicksman, M. E., and Tirmizi, S. H., "Dendritic Growth with Crystalline Anisotropy," J. Cryst. Growth, 1989 (in press).

Murthy, A. and Szekely, J., "Some Fundamental Aspects of Mixing in Metallurgical Reaction Systems," Met. Trans. B, 1985 (accepted).

Myers, S. A. and Koch, C. C., "The Effect of Composition and Cooling Rate on the Structure of Rapidly Solidified $(Fe,Ni)_3Al$-C Alloys," J. Mat. Res., 1988 (in press).

Myers, S. A. and Koch, C. C., "Electron Diffraction Structure Analysis of Rapidly Solidified $(Fe,Ni)_3Al$-C Alloys," Ultramicroscopy, 1988 (in press).

Nandapurkar, P. and Poirier, D. R., "The Enthalpies of a Binary Alloy During Solidification," Met. Trans. A 19, 3057-3061 (1988).

Nandapurkar, P., Poirier, D. R., Heinrich, J. C., and Felicelli, S., "Thermosolutal Convection During Dendritic Solidification of Alloys, Part I: Linear Stability Analysis," Met. Trans. 20B, 711 (1989).

Neugebauer, G. T. and Wilcox, W. R., "Convection in the Vertical Bridgman-Stockbarger Technique," J. Crystal Growth 92, 143-154 (1988).

Nordine, P. C. and Schiffman, R. A., "Direct Emissivity Measurements on quids and Corrections to Multi-Color Pyrometers," NASA Conf. Publ. 2503, 1988, pp 173-81.

Nordine, P. C., and Schiffman, R. A., "Containerless i.as Induced Fluorescence Study of Vaproization and Optical Properties for Sapphire and Alumina," Adv. Ceram. Mat. 3, 478 (1988).

Nordine, P. C., Schiffman, R. A., Weber, J.K.R., and Krishnan, S., "Containerless Laser-Induced Fluorescence Study of Boron Vaporization," High Temp. Sci. (in press).

Nordine, P. C. and Schiffman, R. A., "Imaging of Supersonic Levitation Jets by Laser-Induced Fluorescence from Atomic Mercury, AIAA Journal (submitted).

Ohsaka, K. and Trinh, E. H. "Melting and Solidification of Acoustically Levitated Drops," J. Cryst. Growth, 1989 (in press).

Oztekin, A. and Pearlstein, A.J., "Coriolis Suppression of Convection in Unidirectional Solidification of a Binary Alloy," *APS/DFD Annual Meeting*, NASA, Ames Research Center, November 19-21, 1989.

Parang, M., and Catt, J.A., "Convective Air Motion Generated by Rapid Heating in an Enclosure", *28th AIAA Aerospace Sciences Meeting*, Reno, Nevada, January 8-11, 1990.

Perepezko, J. H. and Allen, W. P., "Processing of Undercooled Melts", in *Proceedings of the Third International Colloquium on Drops and Bubbles*, ed. T. Wang (in press).

Piccone, T. J., Wu, Y., Shiohara, Y., and Flemings, M. C., "Solidification of Undercooled Nickel and Nickel-Tin Alloys," in *Proceedings of International Conference, Solidification Processing 1987*, The Institute of Metals, 268-270 (1988).

Piccone, T. J., Zhao, Q., Shiohara, Y., and Flemings, M. C., "Transition Between Thermal and Solute Diffusion Controlled Dendritic Growth in Highly Undercooled Ni-Sn Alloys," in *Proceedings of MRS International Meeting on Advanced Materials*, May-June 1988 (in press).

Poirier, D. R., "Segregation and Convection in Dendritic Alloys," *Progress in Low-Gravity Fluid Dynamics* (J. N. Koster and R. L. Sani, eds.), AIAA, 1990, to be published.

Poirier, D. R. and Yeum, K., "Modelling Interdendritic Porosity," in *Proceedings of Solidification Processing 1987,* The Institute of Metals, London, 1988, pp. 26-28.

Riley, D. S. and Davis, S. H., "Eckhaus instabilities in generalized LandauGinzburg equations," Phys. Fluids A, 1988 (in press).

Riley, D. S. and Davis, S. H., "Hydrodynamic stability of a melt during the solidification of a binary alloy with small segregation coefficient," Physica D, 1989 (in press).

Riley, D. S. and Davis, S. H., "Long-wave morphological instabilities in the directional solidification of a dilute binary mixture," SIAM J. Appl. Math., 1989 (in press).

Riley, D. S. and Davis, S. H., "Long-wave interactions in morphological and convective instabilities," (pending publication).

Robinson, M.B., Bayuzick, R.J., and Hoffmeister, W. H., "Undercooling Studies in Nb-Pt and Nb-Si Alloys Using the 105-Meter Drop Tube," Adv. in Space Res. (in press).

Rubinstein, E. R., "The Effect Anisotropy on the Structure and Kinetics of Dendritic Growth." Ph.D. Dissertation, Rensselaer Polytechnic Institute, 1988.

Rubinstein, E. R., Tirmizi, S. H., and Glicksman, M. E., "Long Term Purity Assessment in Succinonitrile," J. Cryst. Growth, 1989 (in press).

Rubinstein, E. R. and Glicksman, M. E., "Camphene: Dendritic Growth Kinetics and Structure," J. Cryst. Growth, 1989 (in press).

Rubinstein, E. R. and Glicksman, M. E., "Pivalic Acid: Dendritic Growth Kinetics and Structure," J. Cryst. Growth, 1989 (in press).

Sandlin, A. C., Andrews, J. B., and Curreri, P. A., "Influence of Gravity Level and Interfacial Energies on Directionally Solidified Hypermonotectic Alloys," Met. Trans. 19A, 2665-2669 (1988).

Sandlin, A. C., Andrews, J. B., and Curreri, P. A., "Directional Solidification of Immiscible Cu-Pb-Al Alloys Processed under Alternating High-g/Low-g Conditions," in *Proceedings of VII European Symposium on Materials and Fluid Sciences in Microgravity*, ESA, 1989 (in press).

Sarazin, J. R. and Hellawell, A., "Channel Flow in Partly Solidified Alloys System," in *Proceedings of Symposium on Advances in Phase Transitions,* Pergamon Press, 1988, pp. 101-115.

Sarazin, J. R. and Hellawell, A., "Channel Formation in Pb-Sn, Pb-Sn and Pb-Sn-Sb and Comparison with the System NH_4Cl-H_20," Met. Trans. 19A, 1861-1871 (1988).

Sarazin, J. R. and Hellawell, A., "Channel Formation During Alloy Solidification," in *Proceedings of Conference on Solidification Processing,* 1988, Institute of Metals, Book #421, 94-97.

Schiffman, R. A., "Levitation, Positioning and Noncontact Property Measurements of High Temperature Materials," presented at the NASA Noncontact Temperature Measurement Workshop, Pasadena, CA, Jan. 17-19, 1989.

Schiffman, R. A., ed., *Proc. 2nd Intl. Symp. on Experimental Methods for Microgravity Materials Science Research,* TMS, Warrendale, PA, 1988.

Shih, W. H., Ebner, C., and Stroud, D., "Potts Lattice Gas Model for the Solid-Liquid Interfacial Tensions of Simple Fluids," Phys. Rev B, 1988 (in press).

Shih, W. H. and Stroud, D., "Two-Component Lattice Gas Model for Surface Segregation in Liquid Alloys," Phys. Rev B, 1988 (in press).

Shih, W. Y., Hirth, J. P., and Stroud, D., "Twin Boundary Energy and Entropy of Simple Metals: A Constant Pressure Monte Carlo Calculation for Al," Phys. Rev. B (in press).

Shiohara, Y., Frier, N., Curreri, P. A., and Russell, K. C., "Microgravity Processing of Monotectic Alloy Composites," in *Advanced Materials and Manufacturing Processes*, 1988 (in preparation).

Stefanescu, D., Dhindaw, B. K., Kacar, A. S. and Moitra, A., "Behavior of Ceramic Particles at the Solid-Liquid Metal Interface in Metal Matrix Composites," Met. Trans., 1988 (in press).

Tewari, S. N., "Undercooling in Ni-31%Mo Alloys," J. Cryst. Growth, 1988 (submitted).

Tewari, S. N., "Dendrite Tip Morphology in Directionally Solidified Pb-8.4 at% Au," Met. Trans., 1988 (submitted).

Tewari, S. N., "Microstructure and Nucleation Behavior of Lead Particles in Rapidly Quenched Immiscible Alloys," J. Mat. Sci. Lett. 8, 1098-1100 (1989).

Tewari, S. N., Nesariker, V. V., and Lee, D., "Side Branch Morphology and Coarsening in Directionally Solidified Pb-8.4 at% Au," Met. Trans. A 20A, 1889-1893 (1989).

Thomas, D. J., Glasgow, T. K., Tewari, S. N., Perepezko, J. H., and Jayaraman, N., "Effect of Process Parameters on Melt-Spun Ag-Cu", Mat. Sci. & Engr. 98, 89-93 (1988).

Trinh, E. H. "Levitation Studies of Physical Properties and of the Nucleation of Undercooled Liquids," in *Proceedings of the VIIth European Symposium on Materials and Fluid Sciences in Microgravity*, ESA, 1989 (in press).

Trinh, E. H. and Perepezko, J. H. "Fluid Dynamics and Solidification of Drops and Shells," in *Progress in Low Gravity Fluid dynamics and Transport Phenomena* (J. Koster, ed.), 1989 (in press).

Trinh, E. H., Marston, P. L., and Robey, J. L., "Acoustic Measurement of the Surface Tension of Levitated Drops," J. Colloid & Interface Sci., 1988 (in press).

Voorhees, P. W., "Coarsening in Binary Solid-Liquid Mixtures," Met. Trans. A (in press).

Wang, L., Laxmanan, V., and Wallace, J. F., "Gravitational Macrosegregation in Small Unidirectionally Solidified Pb-Sn Alloy Ingots," Met. Trans., 1988 (submitted).

Wang, Z. Q. and Stroud, D., "Monte Carlo Studies of the Surface Properties of Liquid Semiconductors: Si and Ge," Phys. Rev. B38, 118 (1988).

Wang, Z. Q., Stroud, D., and Markworth, A. J., "Theory of the Surface Tension of Liquid CdTe," Phys. Rev. B40, 3129 (1988).

Wang, Z. Q. and Stroud, D., "Monte Carlo Studies of Liquid Semiconductor Surfaces: Application to Cd_xTe_{1-x} and a Simple Scaling Formula," Phys. Rev. B (submitted).

Weber, J.K.R., Schiffman, R. A., Krishnan, S., and Nordine, P. C., "Containerless Processing and Property Measurements of High Temperature Liquids and Solids," in *Proceedings 7th European Symposium on Materials and Fluid Sciences in Microgravity*, ESA, 1989 (in press).

Yeum, K. S., Speiser, R., and Poirier, D. R., "Estimation of the Surface Tensions of Binary Liquid Alloys," Met. Trans. B, 1989 (in press).

Yeum, K. S., Laxmanan, V., and Poirier, D. R., "Efficient Estimation of Diffusion During Dendritic Solidification," Met. Trans. A, 1989 (in press).

Yeum, K. and Poirier, D. R., "Modelling Directional Solidification of a Dendritic Alloy," Cast Metals 1, 161-170 (1988).

Young, G. W. and Davis, S. H., "Morphological instabilities in directional solidification of a binary alloy: end effects," SIAM J. Appl. Math. 49, 152 (1988).

Zeng, X. C. and Stroud, D., "Solid-Liquid Interfacial Tension of Diamond-Structure Si and Ge," J. Phys. C 1, 1779 (1989).

Zeng, X. C. and Stroud, D., "Crystal-Melt Interface and an Empirical Law of Freezing," J. Chem. Phys. 90, 5208 (1989).

Zeng, X. C. and Stroud, D., "Ginzburg-Landau Theory for the Solid-Liquid Interfacial Tension of BCC Elements. II. Application to the Classical One-Component Plasma, the Wigner Crystal, and ^{4}He," Phys. Rev. A 390, 4761 (1989).

Zhao, Q., Piccone, T. J., Shiohara, M. C., and Flemings, M. C., "Rapid Dendritic Growth of Highly Undercooled Iron-Nickel Alloys," in *Proceedings of MRS International Meeting on Advanced Materials*, May-June 1988 (in press).

Fluids, Interfaces, and Transport

Alexander, J.I.D., Xiao, R-F., and Rosenberger, F., "Morphological Evolution of Growing Crystals - A Monte Carlo Simulation," Phys. Rev. A, 1988 (submitted).

Arpaci, V. S., Selamet, A., Chai, A. T., and Duh, J. C., "Multiscale Dimensional Foundations of Surface Tension and/or Buoyancy Driven Flows," in *Proceedings of the 7th European Symposium on Materials and Fluid Sciences in Microgravity*, ESA, 1989 (in press).

Balasubramaniam, R. and Wilkinson, R. A., "Electrohydrodynamic Migration of Charged Droplet in an Insulating Fluid," in *Proceedings of First National Fluid Dynamic Congress*, Cincinnati, July 1988 (in press).

Balasubramaniam, R., and Lavery, J. E., "Numerical Simulation of Thermocapillary Bubble Migration Under Microgravity for Large Reynolds and Marangoni Numbers," Num. Heat Transf., in press.

Bamocky, G. and Davis, R. H., "The Lubrication Force Between Spherical Drops, Bubbles and Rigid Particles in a Viscous Fluid," Int.l J. Multiphase Flow 15, 627-638 (1989).

Banish, R. M., Xiao, R-F., and Rosenberger, F., "Vapor Concentration Measurement with Photothermal Deflection Spectroscopy," J. Appl. Phys., 1988 (submitted).

Barton, K. D. and Subramanian, R. S., "The Migration of Liquid Drops in a Vertical Temperature Gradient," J. Colloid Interface Sci., 1989 (in press).

Baum, B.A., Krantz, W.B., Fink, J.H. and Dickenson, R.E., "Taylor Instability in Rhyolite Lava Flows," J. Geophys. Res. 94, 5815-5828 (1989).

Bennett, M., Brown, R. A., and Ungar, L. H., "Nonlinear Interactions of Interface Structures of Differing Wavelength in Directional Solidification," in *Physics of Structure Formation: Theory and Simulation* (W. Guttinger and G Dagelmyar, eds.), Springer-Verlag, 1987, pp. 180-190.

Bennett, M. B., Brown, R. A., and Ungar, L. H., "Cellular Dynamics During Direction Solidification: Interactions of Multiple Cells," Phys. Rev. B, 1988.

Biringen, S. and Danabasoglu, G., "Computation of Convective Flow with Heat Transfer in Rectangular Cavities," J. Thermophys. Heat Transfer (accepted).

Biringen, S. and Danabasoglu, G., "Oscillatory Flow with Heat Transfer in a Square Cavity," Phys. Fluids (accepted).

Biringen, S. and Peltier, L. J., "Numerical Simulation of 3-D Benard Convection with Gravitational Modulation," Phys. Fluids (submitted).

Brattkus, K. and Davis, S. H., "Cellular Growth Near Absolute Stability," Phys. Rev. B, 1988 (in press).

Brattkus, K. and Davis, S. H., "Directional Solidification with Heat Losses," J. Cryst. Growth, 1988 (in press).

Brown, R. A., "Numerical Analysis of Solidification Microstructure," in *Supercomputer Research in Chemistry and Chemical Engineering*, Symp. Ser. v. 353 (D. Truhlar and K. Jensen, eds.), ACS, 1987, pp. 295-333.

Brown, R. A., "Transport Processes in Melt Crystal Growth," in Chemical Engineering in Microelectronics (K. Jensen and D. Hess, eds.), ACS, 1987.

Brown, R. A., "Theory of Transport Processes in Single Crystal Growth from the Melt: Journal Review," AIChE J. 34, 881-911 (1988).

Brown, R. A. and Leal, L. G., "Numerical Methods for Viscous Free-Surface Flows," Ann. Rev. Fluid Mech., 1988 (in press).

Canright, D. R. and Davis, S. H., "Similarity Solutions for Phase-Change Problems," Met. Trans., 1988 (in press).

Chae, H. B., Schmidt, J. W., and Moldover, M. R., "Surface Tension of Refrigerants R123 and R134a," J. Chem. Eng. Data, in press.

Chai, A. T., Duh, J. C., and Arpaci, V. S., "A Proposed Study on Liquid Droplet Evaporation under Microgravity," in *Proceedinqs of the 7th European SYmposium on Materials and Fluid Sciences in Microgravity*, ESA, 1989 (in press).

Chikhaoui, A., Marcillat, J. F., and Sani, R. L., "Successive Transitions in Thermal Convection within a Vertical Enclosure," *Experimental Heat Transfer, Fluid Mechanics and Thermodynamics* (Shah, Ganic and Yang, eds.), Elsevier, 1988, pp. 701-708.

Chikhaoui, A., Bontoux, P., Maslanik, M. K., and Sani, R. L., "Steady Three-dimensional Thermal Convection in Vertical Rectangular Enclosure: Transition to Multicellular Flow," Commun. Appl. Num. Meth., 1988 (in press).

Chow, C.Y. and Harvanek, M., "Viscous Effects on the Capillary Instabilities of a Hollow Liquid Cylinder," AIAA Paper 90-0512, 1990.

Chow, C. Y. and Harvanek, M., "Electromagnetic-Capillary Instabilities of a Hollow Liquid Cylinder: Production of Spherical Shells under Microgravity Conditions," AIAA paper 88-3729, in *Proceedings of First National Fluid Dynamics Congress,* July 1988; to appear in *AIAA Journal,* February 1990.

Coriell, S. R., McFadden, G. B., and Sekerka, R. F., "Convective and Interfacial Instabilities during Solidification, *Physicochemical Hydrodynamics* (M. G. Velarde, ed.), Plenum, 1988, pp. 559-569.

Coriell, S. R., McFadden, G. B., Wheeler, A. A., and Hurle, D. T. J., "The Effect of an Electric Field on the Morphological Stability of the Crystal-Melt Interface of a Binary Alloy II. Joule Heating and Thermoelectric Effects, J. Cryst. Growth 94, 334-346 (1989).

Coriell, S. R. and McFadden, G. B., "Buoyancy Effects on Morphological Instability during Directional Solidification," J. Cryst. Growth 94, 513-521 (1989).

Crespo del Arco, E., Bontoux, P., Sani, R. L., Hardin, G., Extremet, G. P., and Chikhaoui, A., "Finite Difference Solutions for Three-Dimensional Steady and Oscillatory Convection in Vertical Cylinders - Effect of Aspect Ratio," Natural Convection in Enclosures, ASME HTD 99, 67-76 (1989).

Danabasoglu, G. and Biringen, S., "Computation of Convective Flow with G-jitter in Rectangular Cavities," in *Proceedings of First National Fluid Dynamics Congress*, July 1988 (submitted).

Davis, R. H., "Near Contact Hydrodynamics of Two Viscous Drops," in *Proceedings Third International Colloquium on Drops and Bubbles*, Monterey, California, September 18-21, 1988 (in press).

Davis, R. H., Schonberg, J. A., Rallison, J. M., "The Lubrication Force Between Two Viscous Drops," Phys. Fluids A 1, 77-81 (1989).

Davis, R. H., "Near-Contact Hydrodynamics of Two Viscous Drops." in *Proceedings of Third International Colloquium on Drops and Bubbles*, in press.

Derby, J., Atherton, L., Thomas, P., and Brown, R. A., "Finite Element Methods for Analysis of the Dynamics and Control of Czochralski Crystal Growth," J. Sci. Comput. 2, 297-343 (1987).

Dijkstra, H. A. and P. H. Steen, "Thermocapillary Stabilization of the Capillary Breakup of an Annular Film of Liquid," J. Fluid Mech., 1989 (in press).

Dijkstra, H. A., "The Coupling of Marangoni and Capillary Instabilities in an Annular Thread of Liquid," J. Colloid & Interface Sci., 1989 (in press).

Dill, L. H. and Balasubramaniam, R., "Unsteady Thermocapillary Migration of Bubbles," in *Proceedings of Third International Colloquium on Drops and Bubbles*, Monterey, CA, September 1988.

Duh, J. C., and Yang, W.-J., "Numerical Analysis of Natural Convection in Liquid Droplets by Phase Change," J. Num. Heat Transf. 16, 129-154 (1989).

Duranceau, J. L. and Brown, R. A., "Analysis of the Coupling Between Melt Flow and Zone Shape in Small-Scale Floating Zones," J. Cryst. Growth, 1988 (in press).

Duranceau, J. L. and Brown, R. A., "Melt Convection and Interface Morphology in Microgravity Floating Zones," J. Cryst. Growth, 1988 (in press).

Engelman, M. S. and Sani, R. L., "Finite Element Simulation of Temperature Dependent Free Surface Flows," in *Proceedings of Fourth International Symposium on Numerical Methods in Thermal Problems*, Swansea, UK, 1985 (accepted).

Extremet, G. P., Fontaine, J-P., Chaouche, A., and Sani, R. L. "Two- and Three Dimensional Finite-Element Simulations of Buoyancy-Driven Convection in a Confined Pr = 0.015 Liquid Layer," in *Proceedings of GAMM Workshop and The Numerical Simulation of Oscillatory Convection in Low-Prandtl Number Fluids*, Marseille, France, 1989.

Fehribach, J. D. and Rosenberger, F., "Analysis of Models for Two Solution Crystal Growth Problems", J. Cryst. Growth, 1988 (in press).

Giarratano, P. J., Kumakawa A., Arp, V. D., and Owen, R. B. "Transient Heat Transfer Studies in LowGravity Using Holographic Interferometry," J. Thermophys.& Heat Transf. 4, 53-58 (1990).

Greenberg, A. R., Gleason, K. J., Wray, M.D., and Krantz, W. B., "Influence of Processing on the Morphology of Cellolose Acetate Thin Films," Polymer Preprints 29, 579-580 (1988).

Greenberg, A. R., Gleason, K. J., Wray, M. D., and Krantz, W. B., "Thermal Behavior of Secondary (CA) and Tertiary (CTA) Cellulose Acetates," Proc. 17th No. Amer. Thermal Analysis Soc. Conf., 809-814 (1988).

Hardin, G. R. and Sani, R. L., "Buoyancy-Driven Instability in a Vertical Cylinder: Binary Fluids with Soret Effect, Part 2: Weakly Nonlinear Solutions," to be submitted to Int'l. J. Num. Meth. in Fluids, 1988.

Hardin, G. R., Sani, R. L., Henry, D. and Roux, B., "Buoyancy-Driven Instability in a Vertical Cylinder: Binary Fluids with Soret Effect. Part I: General Theory and Stationary Instability Results," Int'l. J. Num. Meth. in Fluids, 1989 (in press).

Hart, J. E. and Pratte, J. M., "A Laboratory Study of Oscillations in Differentially Heated Layers of Mercury," *Proceedings of GAMM Workshop on Low-Prandtl Number Convection*, October 1988.

Hasan, M.M., and Balasubramaniam, R., "Thermocapillary Migration of a Large Gas Slug in a Tube," J. Thermophys. & Heat Transf. 3, 87-89 (1989).

Herczynski, A. and Kassoy, D. R., "Response of a Confined Gas to Volumetric Heating in the Absence of Gravity I: Slow Transients," Phys. Fluids (in press).

Hung, R. J., Tsao, Y. D., Hong, B. B., and Leslie, F. W., "Dynamical Behavior of Surface Tension on Rotating Fluids in Low and Microgravity Environments," Appl. Micro. Tech. 2(2), 81-95 (1989).

Jackson, H. W., Barmatz, M. and Shipley, C., "Equilibrium Shape and Location of a Liquid Drop Acoustically Positioned in a Resonant Rectangular Chamber," J. Acoust. Soc. Am. 84, 1845, (1988).

Kamotani, Y. and Lee, K. G., "Oscillatory Thermocapillary Flow in a Liquid Column Heated By a Ring Heater," PCH Journal, 1989 (in press).

Kim, H. S. and Subramanian, R. S., "The Thermocapillary Migration of a Droplet With Insoluble Surfactant Part I. Surfactant Cap," J. Colloid & Interface Sci. 127, 417-28 (1989).

Kim, H. S. and Subramanian, R. S., "The Thermocapillary Migration of a Droplet With Insoluble Surfactant Part II. General Case," J. Colloid & Interface Sci. 130, 112-29 (1989).

Lai, C. L., Ostrach, S., and Kamotani, Y., "The Role of Free-Surface Deformation in Unsteady Thermocapillary Flow," in *Proceedings of U.S-Japan Heat Transfer Joint Seminar*, San Diego, 1985 (in press).

Lee, C. P., and Wang, T. G., "The Effects of Sound on the Nucleation Rate of an Undercooled Liquid," (submitted for publication).

Lee, C. P., and Wang, T. G., "Dynamics of Thin Liquid Sheets," in *Proceedings of the Third International Colloquium on Drops and Bubbles*, Monterey, California, 1988, in press.

Lee, C. P., and Wang, T. G., "Near-Boundary Streaming Around a Small Sphere Due to Two Orthogonal Standing Waves," JASA 85 (1989).

Lee, C. P., and Wang, T. G., "Outer Acoustic Streaming," J. Acoust. Soc. Am., 1989 (submitted).

Lee, C. P. and Wang, T. G., "The Centering Dynamics of a Thin Liquid Shell in Capillary Oscillations," J. Fluid Mech., 1988 (in press).

Lee, C. P. and Wang, T. G., "Acoustic Radiation Force on a Heated Sphere Inclding Effects of Heat Transfer and Acoustic Streaming," J. Acoust. Soc. Am., 1988 (in press).

Lee, C. P. and Wang, T. G., "Acoustic Radiation Potential on a Small Sphere due to Two Orthgonal Standing Waves," J. Acoust. Soc. Am., 1988 (accepted).

Leung, E., Baroth, E., Chan, C. K., and Wang, T. G., "Thermal Acoustical Interaction and Flow Phenomenon," Physics of Drops and Bubbles, 1989 (in press).

Maslanik, M. K., Sani, R. L., Gresho, P. M., "An Isoparametric Finite Element Stokes Flow Test Problem." Comm. Appl. Num. Meth., 1989 (in press).

McFadden, G. B., Coriell, S. R., Glicksman, M. E., and Selleck, M. E., "Instability of a Taylor-Couette Flow Interacting with a Crystal-Melt Interface," PCH Physicochem. Hydrodyn. 11, 387 (1989).

McLinden, M. O., Ballagher, J. S., Weber, L. A., Morrison, G., Ward, D., Goodwin, A.R.H., Moldover, M. R., Schmidt, J. W., Ohae, H. B., Bruno, T., Ely, J. F., Huber, M. L., "Measurement and R134a and R123," ASHRAE Trans., in press.

Merchant, G. J. and Davis, S. H., "Morphological Stagnation-Point Flow and Steady Streaming," J. Fluid Mech., 1988 (in press).

Merritt, R. M. and Subramanian, R. S., "Migration of a Gas Bubble Normal to a Plane Horizontal Surface in a Vertical Temperature Gradient," J. Colloid & Interface Sci., 1989 (in press).

Merte, H., "Combined Roles of Buoyancy and Orientation in Nucleate Pool Boiling," Heat Transfer 2, 179-186 (1988).

Merte, H. and Judd. R. L., "Variation of Superheat with Subcooling in Nucleate Pool Boiling," J. Heat Transf., submitted.

Miles, D. G. and Schmidt, J. W., "Structure of the Polymer Solvent Interface," J. Chem. Phys., in press.

Murthy, A., Szekely, J., and El-Kaddah, N., "Experimental Measurement and Numerical Computation of Velocity and Turbulence Parameters in a Heated Liquid Metal System," Met. Trans. 19B, 765-775 (1988).

Nadarajah, A. and Narayanan, R., "Morphological Instability in Dilute Binary Systems: A Uniform Approach," Physicochem. Hydrodynam., 1988 (accepted).

Neitzel, G. P. and Jankowski, D. F., "Application of Energy-Stability Theory to Problems in Crystal Growth," *Progress in Low-Gravity Fluid Dynamics and Transport Phenomena* (J.N. Koster and R.L. Sani, eds), in press.

Ng, L-H. and Sadoway, D. R., "Phase Separation Kinetics in Immiscible Liquids," in *Materials Processing in the Reduced Gravity Environment of Space*, Volume 87 (R.H. Doremus and P.C. Nordine, eds.), 1987, pp. 281-283.

Ng, L-H. and Sadoway, D. R., "Density Measurements in the Succinonitrile-Water System," Can. J. Chem. 66, 2428-2430 (1988).

Ostrach, S., and Rivas, D., "Low Pr Thermocapillary Flow in Shallow Enclosures," PCH Journal, 1989 (in press).

Ouazzani, J., Chiu, K-C., and Rosenberger, F., "On the 2D Modelling of Horizontal CVD Reactors and its Limitation", J. Cryst. Growth 91, 497-508 (1988).

Ouazzani, J. and Rosenberger, F., "Three-Dimensional Modelling of Horizontal Chemical Vapor Deposition I: MOCVD at Atmospheric Pressure, J. Cryst. Growth (accepted).

Peltier, L.J., Biringen, S. and Chait, A., "Application of Implicit Numerical Techniques to the Solution of the Three-Dimensional Diffusion Equation," Int'l. J. Num. Heat Transf. (submitted).

Pratte, J. M. and Hart, J. E., "Endwall Driven, Low Prandtl Number Convection in a Shallow Rectangular Cavity," J. Cryst. Growth (in press).

Ramprasad, N., Bennett, M., and Brown, R. A., "Wavelength Dependence of Cellular Forms for Direction Solidification Cells with Finite Depth," Phys. Rev. 38B, 583-592 (1988).

Rogers, J. R. and Davis, R. H., "Modeling of Collision and Coalescence of Droplets During Microgravity Processing of Zn-Bi Immiscible Alloys." Met. Trans. A. (in press).

Ruggles, J. S., Cook, R. G., and Cole, R., "Microgravity Bubble Migration in Rotating Flows," J. Spacecraft and Rockets, 1990 (in press).

Runesson, K., Larson, R., and Sture, S., "Characterization and Computational Procedure in Softening Plasticity," J. Engr Mech., 1988 (in press).

Russo, M. J., and P. H. Steen, "Shear-stabilization of the Capillary Breakup of a Cylindrical Interface", Phys. Fluids, 1989 (in press).

Sackinger, P. A. and Brown, R. A., "Effect of Sidewall Boundary Conditions on the Existence of Codimension Two Bifurcation Points in Two-dimensional Rayleigh-Benard Convection," Phys. Fluids, 1988 (in press).

Sackinger, P., Brown, R. A., and McFadden, G. B., "Eigen-function Expansions for Determining Structure of Natural Convection in a Vertical Cylinder Heated from Below," J. Fluid Mech., 1988 (in press).

Salvino, R. E., "The Surface Tension of ^{4}He: Low--Temperature Behavior," J. Low Temp. Phys. 76, 121 (1989).

Salvino, R. E., "The Equilibrium Statistical Thermodynamics of a Many--Particle System Coupled to an External Scalar Field," preprint (1989).

Salvino, R. E., "The Newtonian Mechanics of a Many--Particle Assembly Coupled to an External Body Potential," preprint (1989).

Sani, R. L., Peskin, A. P. and Maslanik, M. K., "Flow and Transport in Systems with Shape Change: Mass Transfer in Electrochemical Systems," *Physicochemical Hydrodvnamics: Interfacial Phenomena* (M.G. Velarde, ed.), Plenum Press, 1988, pp. 949-962

Sani, R. L., Maslanik, M. K., and Fathi, Z., "Flow and Transport in Systems with Free and/or Moving Boundaries," *Computational Methods in Flow Analysis* (H. Niki and M. Kawahara, eds.), Okayama University of Science Press, 1988, pp. 729-736.

Saville, D. A. and Baygents, J. C., "The Migration of Charged Drops and Bubbles in Electrolyte Gradients," Physicochem. Hydrodynam., 1988 (in press).

Saville, D. A. and Beaghton, P. J., "Growth of Needle-Shaped Crystals in the Presence of Convection," Phys. Rev. A 37, 3423-3430 (1988).

Schmidt, J. W., "Adsorption at the Vapor-Liquid Interface Near the Consolute Point," Phys. Rev. A, in press.

Sengers, J. V. and van Leeuwen, J.M.J., "Capillary Waves of a Vapor-Liquid Interface near the Critical Temperature," Phys. Rev. A, 1988 (submitted).

Shen, Y., "Energy Stability of Thermocapillary Convection in a Model of Float-Zone Crystal Growth," Ph.D. Dissertation, Arizona State University, May 1989.

Shen, Y., Neitzel, G. P., Jankowski, D. F., and Mittelmann, H. D., "Energy Stability of Thermocapillary Convection in a Model of the Float-Zone, Crystal Growth Process," J. Fluid Mech., submitted.

Sheu, H. R., El-Aasser, M. S., and Vanderhoff, J. W., "Phase Separation in Polystyrene Latex Interpenetrating Polymer Networks," J. Polym. Sci. Polym. Chem. Ed., 1988 (submitted).

Sheu, H. R., El-Aasser, M. S., and Vanderhoff, J. W., "Uniform Nonspherical Latex Particles as Model Interpenetrating Polymer Networks," J. Polym. Sci. Polym. Chem. Ed., 1988 (submitted).

Sutrisno, "Thermomechanically Induced Convective Motion and Natural Convection in Confined Gaseous Helium Subjected to Boundary Heating." Ph.D. Thesis, Mechanical Engineering, Univ. of Colorado, May 1989.

Sutrisno, and Kassoy, D. R., "Thermoacoustic and Natural Convection in Confined Gaseous Helium Subjected to Boundary Heating," J. Fluid Mech. (in press).

Tan, C.-H., Duh, J. C., "Pressure Gradient Method for Solving Incompressible Navier-Stokes Equations with Curvilinear Coordinate System," in *Proceedings of the 7th International Conference on Mathematical and Computer Modelling*, Chicago, August 1989 (in press).

Tan, C.-H., and Duh, J. C., "Comparison Between Pressure Gradient Method and MAC Method on High-Reynolds Flows," in *Proceedings of the 5th International Symposium on Numerical Methods in Engineering*, Lausanne, Switzerland, September 1989.

Trinh, E. H., Marston, P. L., and Robey, J. L., "Acoustic Measurement of the Surface Tension of Levitated Drops," J. Colloid & Interface Sci., 1988 (in press).

Ungar, L. H., Ramprasad, N., and Brown, R. A., "Finite Element Methods for Unsteady Solidification Problems Arising in Prediction of Morphological Structure," J. Sci. Comput. 3, 77-108 (1988).

Wang, T. G., Trinh, E., Croonquist, A., and Elleman, D. D., "Dynamics of Rotating and Oscillating Drops," Physics of Drops and Bubbles, 1989 (submitted).

Wilkinson, R. A., "Critical Phenomena in Microgravity Environments", Bull. Am. Phys. Soc. 34, 718 (1989).

Worden, P. W., "Almost Exactly Zero: The Equivalence Principle," Near Zero, 1986 (in press).

Yiantsios, S. G. and Davis, R. H., "On the Buoyancy Driven Motion of a Drop Towards a Rigid Surface or a Deformable Interface," J. Fluid Mech. (in press).

Young, G. W. and Davis, S. H., "Morphological Instabilities in Directional Solidification of a Binary Alloy: End Effects," SIAM J. Appl. Math., 1988 (in press).

Yung, C. N., De Witt, K. J., Brockwell, J. L., and Chai, C-T., "Factors Affecting the Rate of Bubble Dissolution," J. Colloid & Interface Sci., 1988 (accepted).

Biotechnology

Acrivos, A., Jeffrey, D. J., and D. A. Saville, "Particle Migration in Concentration Suspensions: Thermophoresis and Electrophoresis," J. Fluid Mech., in press.

Adaskaveg, J. E., Stranghellini, M. E., Gilbertson, R. L., and Egen, N. B., "Comparative Protein Studies of Several Pythium Species using Isoelectric Focusing," Mycologia, 1988 (in press).

Baird, J. K., Meehan, E. G., Twigg, P. J., Howard, S. B., Fowlis, W. A., and DeLucas, L. J., "Kinetics of Salt and Solvent Transport in the Hanging Drop and Dialysis Methods of Protein Crystal Growth," J. Protein Cryst. Growth, 1988 (in press).

Bamberger, S. and Van Alstine, J. M., Phase Partitioning in Reduced Gravity," *Progress in Low Gravity Fluid Dynamics and Transport Phenomena* (J.N. Koster and R.L. Sani, eds.), AIAA, 1989 (in press).

Bier, M., "The Lasting and the Emphemeral Virtues of Electrophoresis," *Protein Recognition of Immobilized Ligands* (T.W. Hutchens, ed.), Alan R. Liss, 1989, pp. 237-240.

M. Bier, "Electrokinetics of Aqueous Particle Suspensions," *Particuology'88* (G. Jimbo, J.K. Beddow and M. Kwauk, eds.), Science Press, 1988, pp.309-314.

Bier, M., "Effective Principles for Scaleup of Electrophoresis," *Frontiers of Bioprocessing* (S.S. Sikdar, M. Bier and P. Todd, eds.), CRC Press, (in press).

Bier, M., Twitty G. E., and Sloan, J. E., "Recyling Isoelectric Focusing and Isotachophoresis," J. Chromato. 470, 369-376 (1989).

Bixler, J. W., Bond, A. M., Fifield, M., Poler, J. C., and Thormann, W., "An Evaluation of Ultrathin Ring and Band Microelectrodes as Amperometric Sensors," in *Electrochemical Flow Cells, Electroanalysis*, 1988 (in press).

Bond, A. M., Henderson, T.L.E., Mann, T. F., Mann, D. R., Thormann, W., and Zoski, C. G., "A Fast Electron Transfer Rate for the Oxidation of Ferrocene in Acetonitrile and Dichloromethane at Ultramicroelectrodes," Anal. Chem., 1988 (submitted).

Boyce, J. F., Harris, J. M., Van Alstine, J. M., and Brooks, D. E., "Dextran Coated Glass Slides as a Model for Cell Surface Interactions with Aqueous Two Phase Polymer Systems," in *Advances in Separations Using Aqueous Phase Systems in Biology and Biotechnology* (D. Fisher and I.A. Sutherland, eds.), Plenum Press, 1989, pp. 239-247.

Boyce, J. F., Boyce, B. A. Hovanes, J. M. Harris, J. M. Van Alstine, and D. E. Brooks, "The wetting behavior of aqueous two-phase polymer test systems on dextran coated glass surfaces: Effect of molecular weight," J. Colloid and Interface Sci., 1989 (submitted).

Brooks, D. E., "Cell Partitioning in Two Polymer Phase Systems: Towards Higher Resolution Separations," in *Frontiers in Bioprocessing* (M. Bier, S.K. Sikdar, and P. Todd, eds.), CRC Press, 1988.

Cardello, R. J. and San, K-Y., "The Design of Controllers for Batch Bioreactors," Biotech. Bioengr., 1988 (in press).

Carson, M. and Bugg, C. E., "An Algorithm for Ribbon Models of Protein," J. Molec. Graph., 1985 (in press).

Cherry, R. S. and Papoutsakis, E. T., "Physical Mechanisms of Cell Damage in Microcarrier Cell Culture Bioreactors," Biotech. Bioengr., 1988 (in press).

Cherry, R. S. and Papoutsakis, E. T., "Modeling of Contact-Inhibited Animal Cell Growth on Flat Surfaces and Spheres," Biotech. Bioengr., 1988 (in press).

Cherry, R. S. and Papoutsakis, E. T., "Growth and Death Rates of Bovine Embryonic Kidney Cells in Turbulent Microcarrier Bioreactors," Bioprocess Engineering, 1988 (in press).

Cohly, H. P., Morrison, D. R. and Atassi, M. Z., "Presentation of Antigen to T-Lymphocytes by Non-immune B-cell Hybridomas," Immunological Investigations 17, 1988 (in press).

Curreri, P. A., Van Alstine, J. M., Brooks, D. E.,
Bamberger, S., and Snyder, R. S., "On the Stability of High Volume Fraction Immiscible Dispersions in Low Gravity," Met. Trans., 1985 (submitted).

Cherry, R. S. and Papoutsakis, E. T., "Physical Mechanisms of Cell Damage in Microcarrier Cell Culture Bioreactors," Biotechnol. Bioengr., 1988 (in press).

Cherry, R. S. and Papoutsakis, E. T., "Modeling of Contact-Inhibited Animal Cell Growth on Flat Surface and Spheres," Biotechnol. Bioengr., 1987 (submitted).

Cherry, R. S. and Papoutsakis, E. T., "Growth and Death Rates of Bovine Embryonic Kidney Cells in Turbulent Microcarrier Bioreactors," Bioproc. Engr., 1988 (in press).

Danon, A., Goldstein, A. H., McDaniel, R. S., Humphreys, R. C., and Sammons, D., "Identification of In Vitro Translation Products Associated with Halophytic or Salt Stressed Growth of *Lycopersicon pennellii*," in *Proceedings of the National Academy of Sciences*, 1988 (submitted).

DeLucas, L. J., Smith, C. D., Smith, H. W., Senadhi, V-K, Senadhi, S. E., Ealick, S. E., Carter, D. C., Snyder, R. S., Weber, P. D., Salemme, F. R., Ohlendorf, D. H., Einspahr, H. M., Navia, M. A., McKeever, B. M., Nagabhushan, T. L., Nelson, G., McPherson, A., Koszelak, S., Taylor, G. Stammers, D., Powell, K., Darby, G., and Bugg, C. E. "Protein Crystal Growth in Microgravity," Science 246, 651-654 (1989).

DeLucas, L. J., Smith, C. D., Smith, H. W., Senadhi, V-K, Senadhi, S. E., Ealick, S. E., Carter, D. C., Snyder, R. S., Weber, P. D., Salemme, F. R., Ohlendorf, D. H., Einspahr, H. M., Navia, M. A., McKeever, B. M., Nagabhushan, T. L., Nelson, G., McPherson, A., Koszelak, S., Taylor, G. Stammers, D., Powell, K., Darby, G., and Bugg, C. E. "Protein Crystal Growth Results for Shuttle Flights STS-26 and STS-29," J. Cryst. Growth, 1989 (in press).

DeMattei, R. C. and R. S. Feigelson, "Growth Rate Study of Canavalin Single Crystals," J. Cryst. Growth, 1989 (accepted).

DeMattei, R. C. and R. S. Feigelson. "Solubility of Canavalin," *The Third International Conference of the Crystal Growth of Biological Macromolecules*, August 13-19, 1989, Washington, D.C.

DeMattei, R. C. and R. S. Feigelson, "Preliminary Comparisons of Buoyancy Driven Flows Around Growing Crystals in Inorganic and Biological Systems-Rochelle Salt, Lysozyme and Canavalin," to be published.

Dust, J. M. and J. M. Harris, "The picryl ether of polyethylene glycol," J. Polym. Sci. Poly Chem. Edn., 1989 (in press).

Egen, N. B., Bliss, M., Mayersohn, M., Owens, S. M., Arnold, L., and Bier, M., "Isolation of Monoclonal Antibodies to Phencyclidine from Ascites Fluid by Preparative Isoelectric Focusing in the Rotofor," Analyt. Biochem., 1988 (in press).

Egen, N. B., Cuevas, W. A., McNamara, P. J., Sammons, D. W., Humphreys, R., and Songer, J. G., "Purification of the Phospholipase D of Corynebacterium Psuedo Tuberculosis by Recycling Isoelectric Focusing," Am. J. Vet. Res., 1988 (in press).

Egen, N. B., DeLucas, L., Petre, M., and Bier, M., "Isolation of Aldose Reductase from Porcine Eye Lens," BioRadiations, 1988 (in press).

Fehribach, J. D. and Rosenberger, F., "Analysis of Models for Two Solution Crystal Growth Problems", J. Cryst. Growth, 1988 (in press).

Feigelson, R. S., "The Relevance of Small Molecule Crystal Growth Theories and Techniques to the Growth of Biological Macromolecules," J. Cryst. Growth 90, 1 (1988)

Geier, B. M., Kleinhans, P., Zimmerman, U., Hannig, K., and Sammons, D. W., "The Influence of Electrofusion Conditions on the Free-Flow Electrophoretic Mobility and Size Distribution of Myeloma Cells," Electrophoresis, (in press).

Goochee, C. F. and Passini, C. A., "Intracellular Proteins Produced by Mammalian Cells in Response to Environmental Stress," Biotechnology Progress, 1988 (in press).

Harris, J. M. and K. Yoshinaga, "Assessment of the effects of tethering an enzyme to glass by a polyethylene glycol tether," J. Bioactive and Compatible Polymers 4, 281-295 (1989) .

Heydt, A. and Mosher, R. A., "The Impact of Boundary Conditions in Free Flow Field Step Electrophoresis," Electrophoresis, in press.

Kim, I. and Cho, Y., "The Hydrodynamics of Bent Cylinder in Viscoelastic Fluid," J. Non Newt. Fluid Mech., 1989 (in press.)

Kim, J. and Cho, Y., "The Hydrodynamics of a Thin Cylinder Falling in a Viscoelastic Fluid," J. Fluid Dynam. (submitted).

McIntire, L. V., "Shear Stress Induced Stimulation of Mammalian Cell Metabolism," Biotech. Bioengr., 1988 (in press).

Mosher, R. A., Dewey, D., Thormann, W., Saville, D. A., and Bier, M., "Computer Simulation and Experimental Validation of the Electrophoretic Behavior of Proteins," Anal. Chem. 61, 362-366 (1989).

Mosher, R. A., Kuhn, R., Wagner, H., and Thormann, W., "Experimental and Theoretical Dynamics of Isoelectric Focusing III: Transient Multi-peak Approach to Equilibrium of Proteins in Simple Buffers," Electrophoresis, in press.

Myers, D. F. and Saville, D. A., "Dielectric Spectroscopy of Colloidal Suspensions I. The Dielectric Spectrometer," J. Colloid & Interface Sci. 131, 448-460 (1989).

Myers, D. F. and Saville, D. A., "Dielectric Spectroscopy of Colloidal Suspensions II. Comparisons Between Theory and Experiment," J. Colloid & Interface Sci. 131, 461-470 (1989).

Niranjan, S. C. and San, K.-Y., "Optimal Feedback Control of a Bioreactor with a Remote Sensor," in *Proceedings of Automatic Control Conference*, Atlanta, Georgia, 1988 (in press).

Nyce. T. A. and Rosenberger, F., "Growth of Protein Crystals Suspended in a Closed Loop Thermosyphon", J. Cryst. Growth (accepted).

Plank, L. D., Kunze, M. E., and Todd, P., "Electrophoretic Migration of Animal Cells in Vertical Ficoll Gradient, Theory and Experiment," J. Biochem. Biophys. Meth., 1988 (submitted).

Plank, L. D., Kunze, M. E., Gaines, R. A., and Todd, P., "Density Gradient Electrophoresis of Cell in a Reversible Gel," Electrophoresis, 1988 (submitted).

Porath, J., "Electron-Donor-Acceptor Chromatography (EDAC) for Biomolecules in Aqueous Solutions," *Protein Recognition of Immobolized Ligands* (T.W. Hutchens, ed.), 1989, pp. 101-122.

Pusey, M. L., Witherow, W. K., and Naumann, R. J., "Preliminary Investigations into Solutal Flow About Growing Tetragonal Lysozyme,: J. Cryst. Growth, 1988 (in press).

Rhodes, P. H., Snyder, R. S., and Roberts, G. V., "Electrohydrodynamic Distortion of Sample Streams in Continuous Flow Electrophoresis," J Colloid & Interface Sci. 129, 78-90 (1989).

Roberts, G. O., Rhodes, P. H., and Snyder, R. S., "Dispersion Effects in Capillary Zone Electrophoresis," J. Chromato. 480, 35-67 (1989).

Sammons, D. W., N. Pan, K. H. Kwan, W-J. Ko, N.H. Lin, Y.M. Fong, J.S. Lanchburn and R. W. Knowles, "Computerized Analysis of 2-D Gel Patterns of the HLA Class Antigens," *Immunobiology of HLA*, Volume 1 (B. Dupont, ed.), Springer-Verlag, 1989.

Sammons, D. W., R. C. Humphreys, N. H. Lin, K. H. Kwan, W. J. Ko, N. Egen, F. S. Markland and K. Chen, "Computerized Strategy for Estimation of Protein Purity," *Frontiers of Bioprocessing* (S.S. Sikdar, M. Bier and P. Todd, eds.), CRC Press, (in press).

San, K.-Y., "An Expert System Based pH Controller - A Comparative Study with Conventional and Adaptive Controllers," Chem. Engr. Commun., 1988 (in press).

Schnettler, R., Gessner, P., Zimmerman, U., Neil, G. A., Urnovitz, H. B., and Sammons, D. W., "Increased Efficiency of Mammalian Somatic Cell Hybrid Production Under Microgravity Conditions During Ballistic Rocket Flight," J. Microg. Res., 1988 (in press).

Sharnez, R. and Sammons, D., "Resolving Real and Apparent Heterogeneity in Continuous Flow Electrophoresis," BioPharm Manufacturing, 1988 (submitted).

Sloan, J. W., Thormann, W., Twitty, G. E., and Bier, M., "Automated Recycling Free Fluid Isotachoporesis. Principle, Instrumentation and First Results," J. Chromato. 457, 137-148 (1988).

Snyder, R. S. and Rhodes, P. H., "Electrophoresis Experiments in Space," in *Frontiers in Bioprocessing* (S.K. Sikdar, M. Bier, and P. Todd), CRC Press, 1990, pp. 245-258.

Thormann, W. and Mosher, R. A., "Theory of Electrophoretic Transport and Separations: The Study of Electrophoretic Boundaries and Fundamental Separation Principles by Computer Simulation, in *Advances in Electrophoresis*, Volume 2 (A. Chrambach, M.J. Dunn and B.J. Radola, eds.), VCH, 1988 (in press).

Thormann, W., M. A. Firestone, M. L. Dietz, T. Cecconie, and R. A. Mosher, "The Focusing Counterparts of Electrical Field Flow Fractionation and Capillary Zone Electrophoresis: Electrical Hyperlayer FFF and Capillary IEF," J. Chromato. 461, 95-101 (1989).

Thormann, W. and Firestone, M. A., "Capillary Electrophoretic Separations," *High Resolution Protein Purification* (J.C. Jansson and L. Riden, eds.), VCH Publishing, 1989.

Thormann, W. and Mosher, R. A., "Theory of Electrophoretic Transport and Separations:: The Study of Electrophoretic Boundaries and Fundamental Separation Principles by Computer Simulation," Advances in Electrophoresis 2, 45-108 (1989).

Van Alstine, J. M., Karr, L. J., Harris, J. M., Snyder, R. S., Bamberger, S., Matsos, H. C., Curreri, P. A., Boyce, J., and Brooks, D. E., "Phase Partitioning in Space and on Earth," in *Immunobiology of Proteins and Peptides IV* (M.Z. Atassi, ed.), Plenum Press, 1988, pp. 305-326.

Van Alstine, J. M., Brooks, D. E., Sharp, K. A., Snyder, R. S., Karr, L. J., and Harris, J. M., "Novel Uses of Polymer Phase Partition Affinity Ligands," in *Advances in Separations Using Aqueous Phase Systems in Biology and Biotechnology* (D. Fisher and I.A. Sutherland, eds.), Plenum Press, 1989 (in press).

Van Alstine, J. M., Bamberger, S., Harris, J. M., Snyder, R. S., Boyce, J. F., and Brooks, D. E., "Phase Partitioning Experiments on Shuttle Flight STS-26," in *Proceedings of 7th European Symposium on Materials Sciences under Microgravity*, ESA SP-295, 1989 (in press).

Wenger, P., Heydt, A., Egen, N. B., Long, T. D., and Bier, M., "Purification of Lentil Lectins Using Preparative Electrophoresis," J. Chromato., 1988 (in press).

Yoshinaga, K. and J. M. Harris, "Effects of coupling chemistry on activity of a polyethylene glycol-modified enzyme," J. Bioactive and Compatible Polymers 4, 17-24 (1989).

Young, C. C., R.C. DeMattei, R. S. Feigelson and W. A. Tiller, "Some Implications of Colloid Stabllity Theory for Protein Crystallization," J. Cryst. Growth 90, 79 (1988).

Zukoski, C. F. and Saville, D. A., "Electrokinetic Properties of Particles in Concentrated Suspensions: Heterogeneous Suspensions," J. Colloid Interface Sci., in press.

Glasses and Ceramics

Weinberg, M. C. and Zanotto, E. D., "Re-Examination of the Temperature Dependence of the Classical Nucleation Rate: Homogeneous Crystal Nucleation in Glass," J. Non-Cryst. Solids 108, 99 (1989).

Weinberg, M. C. and Zanotto, E. D., "On the Calculation of the Volume Fraction Crystallized for Non-Isothermal Transformations," Phys. Chem. Glasses, 1989 (in press).

Weinberg, M. C., Uhlmann, D. R. and Zanotto, E. D., "On the 'Nose Method' of Calculating Critical Cooling Rates for Glass Formation," J. Amer. Ceram. Soc. (accepted).

Weinberg, M. C. and Kapral R., "Phase Transformations in Finite Inhomogeneously Nucleated Systems," J. Chem. Phys. (accepted).

Zanotto, E. D. and Weinberg, M. C., "Saturation Effects in Homogeneous and Heterogeneous Crystal Nucleation," J. Non-Cryst. Solids 105, 53 (1988).

Zanotto, E. D. and Weinberg, M. C., "Trends in Homogeneous Crystal Nucleation in Oxide Glasses," Phys. Chem. Glasses, 1989 (in press).

Combustion Science

Altenkirch, R. A. and Vedha-Nayagam, M., "Opposed-Flow Flame Spread and Extinction in Mixed Convection Boundary Layers," in *Proceedings of Twenty-Second International Symposium on Combustion*. 1988 (in press).

Bahadori, M. Y., Edelman, R. B., Stocker, D. P., and Olson, S. L., "Ignition and Behavior of Laminar Gas-Jet Diffusion Flames in Microgravity," AIAA J., 1989 (in press).

Berlad, A. L., "Low Gravity Combustion Through Clouds of Particulates," in *Materials and Fluid Science in Low Gravity* (J.H. Koster, ed.), 1989 (in press).

Berlad, A. L. and Tangirala, V., "Autoignition of Fuel-Oxidizer Mixtures in Microgravity," Acta Astron. 17, 1179 (1988).

Berlad, A. L. and Tangirala, V., "Reduced Gravity Combustion of Particle Clouds," NASA CR-182299 (1988).

Berlad, A. L., Ross, H., Facca, L., and Tangirala, V., "Particle Cloud Flames in Acoustic Fields," Comb. & Flame, 1989 (accepted).

Berlad, A. L., Ross, H., Facca, L., and Tangirala, V., "Radiative Structures of Lycopodium-Air Flames in Low Gravity," AIAA Paper 89-0500, presented at *27th Aerospace Sciences Meeting*, Reno, Nevada (1989); also, J. Propul. & Power, 1989 (accepted).

Berlad, A. L., Tangirala, V., Ross, H., and Facca, L., "Particle Segregation Effects On the Combustion Safety of Dust-Containing Systems," in *Proceedings of 12th International Colloquium on Dynamics of Explosions & Reactive Systems*, July, 1989), Paper No. 034.

Bhattacharjee, S., Altenkirch, R.A., Srikantaiah, N., and Vedha-Nayagam, M., "A Theoretical Description of Flame Spreading over Solid Combustibles in a Quiescent Environment at Zero Gravity," Comb. Sci. & Techn., 1989 (submitted).

Buckmaster, J. D., Joulin, G., Ronney, P. D., "Effects of Heat Loss on the Structure and Stability of Flame Balls," Comb. & Flame, 1989, (in press).

Choi, M.Y., Dryer, F.L., and Haggard J.B., Jr., " Some Further Observations on Micro-gravity Droplet Combustion in the NASA Lewis Drop Tower Facilities," in *Proceedings of Third International Colloquium on Drops and Bubbles*, Monterey, CA, September 18-21, 1989. To be published in the Refereed Proceedings.

Curtis, E. W. and Farrell, P. V., "Droplet Vaporization in a Supercritical Microgravity Environment," Acta Astron 13 (1988).

Curtis, E. W., Hartfield, J., and Farrell, P. V., "Microgravity Vaporization of Liquid Droplets", in *Proceedings of Third International Colloquium on Droplets and Bubbles,* September 1988 (in press).

Farmer, J. N., Ronney, P. D.: "A Numerical Study of Unsteady Nonadiabatic Flames," Comb. Sci. & Techn., 1989 (submitted).

Hamins, A., Meitor, M., and Libby, P. A., "Gravitational Effects on the Structure and Propagation of Premixed Flames," Acta Astron., 1988 (in press).

Libby, P. A., "Theoretical Analysis of the Effect of Gravity on Premixed Turbulent Flames," Comb. Sci. & Techn., 1988 (in press).

Olson, S. L., "The Effect of Microgravity on Flame Spread Over a Thin Fuel", NASA TM 100195, also CWRU Master's Thesis, 1987.

Olson, S. L., Ferkul, P. V., and T'ien, J. S., "Near-Limit Flame Spread Over a Thin Solid Fuel in Microgravity", *Twenty-Second Symposium (International) on Combustion*, The Combustion Institute, pp. 1213-1222, 1988.

Patnaik, G., Kailasanath, K., Oran, E.S., and Laskey, K.J., "Detailed Numerical Simulations of Cellular Flames," Proceedings of the *22nd International Symposium on Combustion,* pp. 1517-1526, The Combustion Institute, Pittsburgh, PA., 1988.

Ronney, P. D., "On the Mechanisms of Flame Propagation Limits and Extinction Processes at Microgravity," in *Proceedings of Twenty Second Symposium (International) on Combustion*, Combustion Institute, 1988, pp. 1615-1623.

Ronney, P. D., "Effect of Chemistry and Transport Properties on Near-Limit Flames at Microgravity," Comb. Sci. & Techn. 59, 123-141 (1988).

Ronney, P. D., "Near-Limit Flame Structures at Low Lewis Number," Comb. & Flame, 1989 (in press).

Ronney, P. D., Sivashinsky, G. I., "A Theoretical Study of Propagation and Extinction of Nonsteady Spherical Flame Fronts," SIAM J. Appl. Math. 49, 1029-1046 (1989).

Ross, H. D., Facca, L. T., Berlad, A. L., and Tangirala, V., "Feasibility of Reduced Gravity Experiments Involving Quiescent, Uniform Particle Cloud Combustion," NASA-TM 101371 (March 1989).

Shaw, B. D., Dryer, F. L., Williams, F. A., and Gat, N., "Interaction Between Gaseous Electrical Discharges and Single Liquid Droplets," Comb. & Flame 74, 233 (1988).

Shaw, B. D., Dryer, F. L., Williams, F. A., and Haggard, J. B., "Sooting and Disruption in Spherically Symmetrical Combustion of Decane Droplets in Air," Acta Astron. 17, 1195 (1988).

Shaw, B. D., and Williams, F. A., "Theory of Influence of Low Volatility, Soluble Impurity on Spherically Symmetric Combustion of Fuel Droplets," Int. J. Heat & Mass Transf., 1989 (in press).

Strehlow, R. A., Noe, K. A., and Wherley, B. L., "The Effect of Gravity on Premixed Flame Propagation and Extinction in a Vertical Standard Flammability Tube," in *Proceedings of 21st International Symposium on Combustion*, Combustion Institute. 1985 (in press).

Physics and Chemistry Experiments (PACE)

Boukari, H., Shaumeyer, J. N., Briggs, M. E., and Gammon, R. W., "Critical Speeding up in Pure Fluids," Phys. Rev. Lett., submitted.

Howald, C., Wang, S., and Meyer, H, "Shear viscosity of ^{3}He-^{4}He Mixtures," Bull. Am. Phys. Soc. 34, 1182 (1989).

Koschmieder, E. L. and Prahl, S. A., "Surface Tension Driven Benard Convection in Small Containers," J. Fluid Mech. (accepted).

Law, B. M., Gammon, R. W., and Sengers, J. V., "Dynamic Light Scattering from Long-Range Density Correlations in a Nonequilibrium Liquid," in Photon Correlations Techniques and Applications Proceedings (J.B. Abbiss and A.E. Smart, eds.), OSA, 1989.

Law, B. M., Segre, P. N., Gammon, R. W., and Sengers, J. V., "Light-scattering Measurements of Entropy and Viscous Fluctuations in a Liquid Far from Thermal Equilibrium," Phys. Rev. (accepted).

Macari-Pasqualino, E. J., "Behavior of Granular Materials in a Reduced Gravity Environment and under Low Effective stresses," Ph.D. Dissertation, University of Colorado at Boulder, August 1989.

Meyer H., "Experimental Techniques for Transport Measurements in Fluid Helium at Low Temperatures," *Transport Properties in Fluids* (A. Nagashima, J.V. Sengers and W.A. Wakeham, eds.), in press.

Runesson, K., Larsson, R., and Sture, S., "Characteristics and Computational Procedure in Softening Plasticity," J. Engr. Mech. 115, 1628-1646 (1989).

Saville, D. A. and Baygents, J. C., "The Migration of Charged Drops and Bubbles in Electrolyte Gradients: Diffusiophoresis Physicochem. Hydrodyn. 10, 543-560 (1988).

Saville, D. A. and Baygents, J. C., "The Circulation Produced in a Drop by an Electric Field: A High Field Strength Electrokinetic Model," in *Proceedings of the Third International Colloquium on Drops & Bubbles*, 1989 (in press).

Schipporeit, T. M., "Stress-strain and Dilatancy Behavior of a Dense Sand at Very Low Effective Stresses," M.S. Thesis, University of Colorado at Boulder, December 1988.

Shaumeyer, J. N. and Gammon, R. W., "Optimizing Fitting Statistics in Photon Correlation Spectroscopy," in *OSA Proceedings on Photon Correlations Techniques and Applications*, 1988 (in press).

Shaumeyer, J. N. and Gammon, R. W., "Optimizing Fitting Statistics in Photon Correlation Spectroscopy," in Photon Correlations Techniques and Applications Proceedings (J.B. Abbiss and A.E. Smart, eds.), OSA, 1989.

Sture, S., Runesson, K. R., and Macari-Pasqualino, E. J., "A Three-Invariant Plasticity Model for Granular Materials," J. Appl. Mech., 1988 (in press).

Sture, S., Runesson, K., and Macari-Pasqualino, E.J., "Analysis and Calibration of a Three-invariant Plasticity Model for Granular Materials," Ing. Arch. Appl. Mech. 59, 253-266 (1989).

Wang, S., Howald, C., and Meyer, H., "Shear Viscosity of Liquid ^{3}He-^{4}He Mixtures near the Superfluid Transition," (submitted).

Worden, P. W., "Measurement and Control of Disturbing Forces on an Equivalence Principle Experiment," in *Proceedings of International Symposium on Gravitational Physics*, Guangzhou, China (P. Michelson, ed.), 1987.

Worden, P. W., "Almost Exactly Zero: The Equivalence Principle," *Near Zero: New Frontiers of Physics* (J.D. Fairbank, B.S. Deaver, C.W.F Everitt, P. Michelson, eds.), W.H. Freeman & Co., 1988, pp. 766-783.

Yung, C. N., De Witt, K. J., Brockwell, J. L., McQuillen, J. B., and Chai, A. T., "A Numerical Study of Parameters Affecting Gas Bubble Dissolution," J. Colloid & Interface Science 127, 442-452, 1989.

Experimental Technology, Facilities and Instrumentation

Allen, J. and Wang, T. G., "High Efficiency Acoustic Chamber," J. Acoust. Soc. Am., 1990 (accepted).

Chang, R. F. and Cezairliyan, A., "The Use of a Pyroelectric Detector for Rapid Measurements of Total Radiant Power," Int. J. Thermophys., 1988 (in press).

Collas, P. and Barmatz, M., "Acoustic Levitation in the Presence of Gravity," J. Acoust. Soc. Am. 86, 777, 1989.

Putterman, S., Rudnick, J. and Barmatz, M., "Acoustic Levitation and the Boltzmann-Ehrenfest Principle," J. Acoust. Soc. Am. 85, 68 (1989).

Rhim, W. K., Chung, S. K., Hyson, M. T., and Elleman, D. D., "Electrostatic Liquid Drop Levitation System," NASATech Brief, 12, 82 (1988).

Rhim, W. K., Chung, S. K., and Elleman, D. D., "Experiments on Rotating Liquid Charged Drops," in *Proceedings of Third International Colloquium on Drops and Bubbles*, 1989 (in press).

Rhim, W. K., Chung, S. K., and Elleman, D. D., "Electrostatic Sample Positioning and Drop Dynamics," in *Proceedings of 7th European Symposium on Materials and Fluid Science in Microgravity*, ESA, 1989 (in press).

Rhim, W. K. and Chung, S. K., "Development of Containerless Protein Crystal Growth Technology," in *Proceedings of Third International Conference on Crystallization of Biological Macromolecules*, 1989 (in press).

Rudnick, J. and Barmatz, M., "Theory of Oscillational Instabilities in Acoustic Resonators," J. Acoust. Soc. Am. (accepted).

Seshan, P. K. and Trinh, E. H. "Contamination Concerns in the Modular Containerless Processing Facility," *27th AIAA Aerospace Meeting*, AIAA paper 89-0403, 1989.

Sridharan, G., Chung, S. K., Elleman, D. D., and Rhim, W. K., "Optical Sample-Position Sensing for Electrostatic Levitation," in *Proceedings of SPIE Space Material Processing Conference*, 1989 (in press).

Trinh, E. H., Gaspar, M., and Leung, E. " Optical Measurement of Sound Pressure", New Technology Report NP0-17565, 1989.

B. EUROPEAN PROGRAM

Electronic Materials

Baumgartl, J., Gewald, M., Rupp, R., Stierlen, J., and Muller, G., "The Use of Magnetic Fields and Microgravity in Melt Growth of Semiconductors: A Comparative Study," in *Proceedings of VII European Symposium on Materials and Fluid Sciences under Microgravity*, 1989 (in press).

Benz, K. W., Danilewsky, A., and Peppermuller, H., "Zuchtung von InP und (In,Ga)P mit der Losungszone," in *BMFT-DFVLR-Status-Bericht Forschung unter Schwerelosigkeit*, Friedrichshafen, February 1988 (in press).

Muller, G., "A Comparative Study of Crystal Growth Phenomena under Reduced and Enhanced Gravity," in *Proceedings of Ninth International Crystal Growth Conference*, Sendai, Japan, 1989 (in press).

Rupp, R., Muller, G., and Neumann, G., "Three-Dimensional Time Dependent Modelling of the Marangoni Convection in Zone Melting Configurations for GaAs," J. Cryst. Growth 97, 34-41 (1989).

Sell, H. and Muller, G., "Numerical Modelling of the Growth and Composition of $Ga_xIn_{1-x}As$ Bulk Mixed Crystals by the Travelling Heater Method," J. Cryst. Growth 97, 194-200 (1989).

Tensi, H. M. and Mackrodt, C., "Possibilities of Investigating the Crystallization Parameters during Unidirectional Solidification," Appl. Micro. Res. 2(2), 68 (1989).

Tillberg, E. and Carlberg, T., "The Inlfuence of Convection on the Solute Distribution in Crystals Grown by the Floating Zone Technique," Appl. Micro. Res. 2(2), 61 (1989).

Weber, W., Neumann, G., and Muller, G., "Stabilizing Influence of the Coriolis Force During Melt Growth on a Centrifuge," J. Cryst. Growth, 1989 (in press).

Metals, Alloys, and Composites

Bewersdorff, A., "Containerless Processing in Space," in *Proceedings of VII European Symposium on Materials and Fluid Sciences in Microgravity*, 1989 (in press).

Caesar, C., Willnecker, R., Koster, U., and Herlach, H. M., "Comparisons of Microstructures and Solidification Behaviour of Melt-Spun Cu-Ni Ribbons and Bulk Undercooled Cu-Ni Alloys," Mat. Sci. Engr. 98, 339 (1988).

Cochrane, R. F., Herlach, H. M., and Willnecker, R., "Grain Refinement Produced by Solidification into Undercooled Melts," in *Proceedings of Indo-U.S. Workshop on Metastable Microstructures,* 1989 (in press).

Cochrane, R. F., Herlach, H. M., and Willnecker, R., "Grain Refinement Produced by Solidification into Undercooled Melts," in in *Proceedings of VII European Symposium on Materials and Fluid Sciences in Microgravity*, 1989 (in press).

Duffar, T., Potard, C., and Dusserre, P., "Growth Analysis of the InSb Compound by a Calorimetric Method in Microgravity, Results of the Spacelab-D1 Experiment," J. Cryst. Growth, 1987 (in press).

Feuerbacher, B., Lohofer, G., and Neuhaus, P., "Viscosity Measurement in Undercooled Metallic Melts," in *Proceedings of VII European Symposium on Materials and Fluid Sciences in Microgravity*, 1989 (in press).

Gillessen, F. and Herlach, D. M., "Thermodynamics of Undercooled Pd-Cu-Si Melts," submitted.

Herlach, D. M., and Gillessen, F., "Pd_3Si Nucleation in Undercooled Pd-Cu-Si Melts," J. Phys. F 17, 1635 (1987).

Herlach, D. M. and Willnecker, R., "Undercooling and Nucleation," in *Rapidly Solidified Alloys* (H.H. Liebermann, ed.), in press.

Holl, S. and Sprenger, H. J., "Numerical Simulation of In-Situ Controlled Solidification Using the Finite Element Method," Appl. Micro. Techn. 2(2), 75-80 (1989).

Kreis, J., Herlach, D. M., Alexander, H., and Weiss, W., "The Solidification Behaviour of Al-Mn Melts," submitted.

Schleip, E., Willnecker, R., Herlach, D. M., and Gorler, G. P., "Measurements of Ultra Rapid Solidification Rates in Greatly Undercooled Bulk Melts by a High Speed Photosensing Device," Mat. Sci. Engr. 98, 39 (1988).

Schleip, E., Herlach, D. M., and Feuerbacher, B., "Controlled Phase Triggering in Metastable Solidification of Metals," submitted.

Willnecker, R., Herlach, D. M., and Feuerbacher, B., "Evidence of Nonequilibrium Processes in Rapid Solidification of Undercooled Metals," Phys. Rev. Lett. 62, 2707 (1989).

Willnecker, R., Herlach, D. M., and Feuerbacher, B., "Free Dendritic Growth in Levitation Undercooled Ni and Cu-Ni Melts," in *Proceedings of VII European Symposium on Materials and Fluid Sciences in Microgravity*, 1989 (in press).

Willnecker, R., Herlach, D. M., and Feuerbacher, B., "Grain Refinement Induced by a Critical Crystal Growth Velocity in Undercooled Melts," submitted.

Fluids, Interfaces, and Transport

Balchin, I. H., Boucher, E. A., and Evans, M.J.B., "Capillary Phenomena, Part 30. The Properties of Heavy Liquid Lenses at Fluid/Fluid Interfaces," J. Colloid & Interface Sci., 1988 (in press).

Bauer, H. F., "Coupled Frequencies of a Rotating Hydroelastic Shell-Liquid System under Zero-Gravity," J. Fluids & Struct. 2, 407-423 (1988).

Bauer, H. F., "Marangoni Convection in Finite Cylindrical Liquid Bridges," Z. Flugwiss. Weltraumf. 12, 332-340 (1988).

Bauer, H. F., "Response of a Spinning Liquid Column to Axial Excitation," Acta Mech. 77, 153-170 (1989).

Bauer, H. F., "Natural Frequencies and Stability of Circular Cylindrical Immiscible Liquid Systems," Appl. Micro. Techn. 2(1), 27-44 (1989).

Bauer, H. F., "Response of an Annular Cylindrical Liquid Column in Zero-Gravity," Forsch. Ing. Wes. 55, 79-88 (1989).

Bauer, H. F., "Marangoni Convection in Rotating Liquid Systems," Appl. Micro. Res. 2(3), 142 (1989).

Bauer, H. F., "Response of a Finite Rotating Annular iquid Layer to Axial Excitation," Forsch. Ing. Wes. 55, 120-127 (1989).

Bauer, H. F., "Damped Response of an Axially Excited Rotating Liquid Bridge under Zero-Gravity," Acta Mech. (in press).

Bauer, H. F., "Response of a Viscous Liquid Column to Axial Excitation in Zero-Gravity," ZAMM (in press).

Bauer, H. F., "Vibrational Behavior of a Viscous Column with a Free Liquid Surface," Z. Flugwiss. Weltraumf. (in press).

Bauer, H. F., "Response of a Liquid Column to One-Sided Axial Excitation in Zero-Gravity," Forsch. Ing. Wes. (in press).

Bauer, H. F., "Axial Response and Transient Behavior of a Cylindrical Liquid Column in Zero Gravity," Z. Flugwiss. Weltraumf. (in press).

Bauer, H. F. and Eidel, W., "Non-linear Oscillations of a Non-viscous Cylindrical Liquid System in Weightlessness Condition," ZAMP 40, 510-525 (1989).

Bauer, H. F. and Eidel, W., "Small Amplitude Liquid Oscillations in a Rectangular Container under Zero Gravity," Z. Flugwiss. Weltraumf. (in press).

Baumgartl, J., Budweiser, W., Muller, G., and Neumann, G., "Studies of Buoyancy Driven Convection in a Vertical Cylinder with Parabolic Temperature Profile," J. Cryst. Growth 97, 9-17 (1989).

Behret, H. and Richter, J., "Physikalische Chemie und Verfahrenstechnik unter Schwerelosigkeit," Nachr. Chem. Tech. Lab. 37, 8 (1989).

Ben-Habid, H., Roux, B., Randriamampianina, A., Crespo, E., and Bontoux, P., "Onset of Oscillatory Convection in Horizontal Layers of Low-Prandtl Number Melts," in *Physicochemical Hydrodynamics: Interfacial Phenomena*, Volume 174 (M.G. Velarde, ed.), Plenum Press, 1988, pp. 997-1028.

Beysens, D., Guenoun, P., and Perrot, F., "Phase Separation of Critical Binary Fluids under Microgravity: Comparison with Matched Density Conditions," Phys. Rev. A 38, 4173 (1988).

Bontoux. P., Elie, F., Smutek, C., Extremet, G. P., Randriamampianina, A., Crespo, E., Branger, H., and Roux, B., "Numerical Simulations of Buoyancy Driven Flows in Cylinders and Cavities for Vapour Crystal Growth," in *Physicochemical Hydrodynamics: Interfacial Phenomena*, Volume 174 (M.G. Velarde, ed.), Plenum Press, 1988, pp. 963-995.

Bontoux. P., Smutek, C., Roux, B., Hardin, G., Sani, R., and Crespo del Arco, E., "Three-dimensional Buoyancy-Driven Flows in Cylindrical Cavities with Differentially Heated End Walls, Part 2: Vertical Cylinders," J. Fluid Mech., 1989 (in press).

Boucher, E. A. and Jones, T.G.F., "Equilibrium and Stability Characteristics of Zero-Gravity Fluid Bridges Constrained Between Equal Solid Rods," J. Colloid & Interface Sci., 1988 (in press).

Castillo, J. L., Garcia-Ybarra, P. K., and Velarde, M. G., "Thermohydrodynamic Instabilities," in *Synergetics and Dynamic Instabilities* (G. Caglioti, H. Hakan, and L. Lugiato, eds.), North Holland, 1988, pp. 219-243.

Chu, X-L. and Velarde, M. G., "Free Surface Convection in a Bounded Cylindrical Geometry," Int. J. Heat Mass Transfer 31, 1979-1982 (1988).

Chu, X-L. and Velarde, M. G., "Electrohydrodynamic Interfacial Oscillations," in *Synergetics, Order and Chaos* (M.G. Velarde, ed.), World Scientific, 1988, pp. 148-157.

Chu, X-L., Chen, L-Y., and Velarde, M. G., "Two-component Benard Steady Convection with Surface Adsorption," in *Physicochemical Hydrodynamics: Interfacial Phenomena* (M.G. Velarde, ed.), Plenum Press, 1988, pp. 343-357.

Chu, X-L. and Velarde, M. G., "Benard-Marangoni Convection in Liquid Layers with a Deformable Open Surface: Note on the Role of Solute Accumulative at the Air-Liquid Interface," J. Colloid & Interface Sci. 127, 205-208 (1988).

Chu, X-L., Castellanos, A., and Velarde, M. G., "Dissipative Hydrodynamic Oscillators. III. EHD Interfacial Phenomena," Il Nuovo Cimento D 11, 727-737 (1988).

Chu, X-L. and Velarde, M. G., "Dissipative Hydrodynamic Oscillators. V. Interfacial Oscillations in a Finite Container," Il Nuovo Cimento D 11, (1989).

Chu, X-L. and Velarde, M. G., "Dissipative Hydrodynamic Oscillators. VI. Transverse Interfacial Motions not Obeying the Lapace-Kelvin Law," Il Nuovo Cimento D 11, (1989).

Chu, X-L. and Velarde, M. G., "Nonlinear Transverse Oscillatory Motions at the Open Surface of a Liquid Layer Subjected to the Marangoni Effect," Phys. Lett A 136, 126-130 (1989).

Chu, X-L. and Velarde, M. G., "Transverse and Longitudinal Waves Induced and Sustained by Surfactant Gradients at Liquid-Liquid Interfaces," J. Colloid & Interface Sci. 131 (1989).

Chu, X-L. and Velarde, M. G., "The Nonlinear Evolution Equations for Space Modulated Interfacial Oscillations Induced and Sustained by the Marangoni Effect," Phys. Lett. A, 1989 (in press).

Chu, X-L. and Velarde, M. G., "Onset of KdV Solitons in Marangoni-Benard Convection," Phys. Rev. Lett, 1989 (in press).

Crespo del Arco, E., Randriamampianina, A., and Bontoux, P., "Two-dimensional Simulation of Time-dependent Convective Flow of a Pr 0 Fluid. A Period Doubling Transition to Chaotic Motion," in *Synergetics, Order and Chaos* (M.G. Velarde, ed.), World Scientific, 1988, pp. 244-257.

Crespo del Arco, E., Bontoux, P., Sani, R. L., Hardin, R. L., and Extremet, G. P., "Steady and Oscillatory Convection in Vertical Cylinders Heated from Below. Numerical Simulation of Asymmetric Flow Regimes," Adv. Space Res. 8, 281-292 (1989).

Crespo de Arco, E., Peyret, R., Pulicani, J. P., and Randriamampianina, A., "Spectral Calculations of Oscillatory Convective Flows," in *Finite Element Analysis in Fluids* (T.J. Hung, ed.), UAH Press, 1989, pp. 1464-1472.

Crespo del Arco, E. and Bontoux, P., "Numerical Simulations and Analysis of Asymmetric Convection Regimes in Cylinders. An Effect of Prandtl Number," Phys. Fluids A 1, 1348-1358 (1989).

Crespo de Arco, E., Pulicani, J. P., Randriamampianina, A., Extremet, G. P., and Bontoux, P., "Complex Flow Regimes in the Melt of a Bridgman Model. Multiple, Steady and Time-dependent Solutions in Two- and Three-dimensional Low-Pr Convection," in *Proceedings of VII European Symposium on Materials and Fluid Sciences in Microgravity*, 1989 (in press).

Crespo de Arco, E., Pulicani, J. P., and Bontoux, P., "Simulations and Analysis of Time-dependent Convection in Low-Pr Fluids," Int. J. Physicochem. Hydrodyn., 1989 (in press).

Croll, A., Muller, S. W., and Nitsche, R., "The Critical Marangoni Number for the Onset of Time-Dependent Convection in Silicon," Mat. Res. Bull. (in press).

Croll, A., Muller, S. W., and Nitsche, R., "Transition from Steady to Time-Dependent Marangoni Convection in Partially Coated Silicon Melt Zones," in *Proceedings of VII European Symposium on Materials and Fluid Sciences in Microgravity*, 1989 (in press).

Delgado, A. and Rath, H. J., "Handhabung von Fluiden in der Schwerelosigkeit mittels Induzierter Rotation," ZAMM, 1988 (in press).

Durr, H. M. and Siekmann, J., "Numerical Studies of Fluid Oscillation Problems by Boundary Integral Techniques," Acta Astron., 1986 (in press).

Ehmann, M., Wozniak, G., and Siekmann, J., "Numerical Analysis of the Thermocapillary Migration of a Fluid Particle under Zero Gravity," Archives of Mechanics, 1989 (in press).

Fontaine, J. P., Crespo del Arco, E., Randriamampianina, A., Extremet, G. P., and Bontoux, P., "Convective Motions in Liquid Metas for Materials Processing. Numerical Simulation of Oscillation Regimes and Effect of Rotation," Adv. Space Res. 8, 265-279 (1989).

Fontaine, J. P., Randriamampianina, A., Extremet, G. P., and Bontoux, P., "Buoyancy-Driven and Forced Convection in Crystal Growth from Melts. Effects of Rotation and Simulations of Oscillation Regimes," in *Finite Element Analysis in Fluids* (T.J. Hung, ed.), UAH Press, 1989, pp. 434-442.

Fontaine, J. P. and Randriamampianina, A., "Simulation of Buoyancy Driven Flows in a Liquid-encapsulated Czochralski Configuration," Int. J. Physicochem. Hydrodyn., 1989 (in press).

Fontaine, J. P. and Randriamampianina, A., and Bontoux, P., "Numerical Simulation of Flow Regimes in a Liquid-encapsulated Czochralski Configuration," Phys. Fluids, 1989 (in press).

Fontaine, J. P. and Randriamampianina, A., Extrememt, G. P., and Bontoux, P., "Simulation of Steady and Time-dependent Rotation-Driven Regimes in LEC Configuration, Computer Modelling in Crystal Growth from the Melt," J. Cryst. Growth, 1989 (in press).

Garcia-Ybarra, P. L. and Velarde, M. G., "Sustained Gravity-Capillary Transverse (Laplace) Waves at Liquid Interfaces," in *Physicochemical Hydrodynamics: Interfacial Phenomena* (M.G. Velarde, ed.), Plenum Press, 1988, pp. 179-182.

Guenoun, P., Beysens, D., and Robert, M., "Growth of a Wetting Layer during Spinodal Decomposition in Absence of Gravity Effect," Phys. Rev. Lett., 1989 (in press).

Hallmann, W., "Physical Unfluences on Drop Samples in a Drop Tower," Appl. Micro. Res. 2(3), 164 (1989).

Hoefsloot, H.C.J. and Hoogstraten, H. W., "Marangoni Instability in Spherical Shells," Appl. Micro. Tech. 2(2), 106-107 (1989).

Holl, S. and Sprenger, H. J., "Numerical Simulation of In-Situ Controlled Solidification using the Finite Element Method," Appl. Micro. Tech. 2(2), 75 (1989).

Jimenez, J. and Velarde, M. G., "Benard-Rayleigh Convection Revisited," in *Synergetics, Order and Chaos* (M.G. Velarde, ed.), World Scientific, 1988, pp. 203-212.

Jimenez, J. and Velarde, M. G., "Dissipative Hydrodynamics Oscillators. II. Rayleigh-Benard Problem for Newtonian and Vicoelastic Fluids with an without Rotation of the Container," Il Nuovo Cimento D 11, 717-726 (1989).

Lamprecht, R., Schwabe, D., and Scharmann, A., "Thermocapillary and Buoyant Convection in an Open Cavity under Normal and Reduced Gravity," J. Fluid Mech., 1988 (submitted).

Martinez, I., "Stability of Liquid Bridges: Results of SL-D1 Experiment," Acta Astron. 15, 449-453 (1987).

Martinez, I., Sanz, A., Perales, J. M., and Meseguer, J., "Freezing of a Long Liquid Column on the Texus-18 SOunding-Rocket Flight," ESA Journal 12(4), 483 (1988).

Martinez, I. and Perales, J. M., "Bidimensional Liquid Bridges in a Gravity Field," Acta Astron. 15, 567-571 (1987).

Martinez, A., Sanz, J. M., Perales, J. M., and Meseguer, J., "Freezing of a Long Liquid Column on the Texus-18 Sounding Rocket Flight," ESA Journal 12, 483-489 (1988).

Meseguer, J., "Axisymmetric Long Liquid Bridges in a Time-dependent Microgravity Field," Appl. Micro. Res. 1(3), 136 (1988).

Meseguer, J., "The Dynamics of Small Annular Jets," J. Fluids Engr. 110, 123-126 (1988).

Meseguer, J. and Sanz, A., "One-dimensional Linear Analysis of the Liquid Injection or Removal in a Liquid Bridge," Acta Astron. 15, 573-576 (1987).

Nahle, R., Neuhaus, D., Siekmann, J., Wozniak, G., and Srulijes, J., "Separation of Fluid Phases and Bubble Dynamics in a Temperature Gradient - A Spacelab D1 Experiment," Z. Flugwiss. Welt., 1988 (in press).

Perales, J. M., "Non-axisymmetric Effects on Long Liquid Bridges," Acta Astron. 15, 561-565 (1987).

Perrot, F., Gastaud, F., Guenoun, P., and Beysens, D., "Spinodal Decomposition Patterns in a Isodensity Critical Binary Fluid: Direct Visualization and Light Scattering Analyses," Phys. Rev. A, 1988 (in press).

Pulicani, J. P., Crespo del Arco, E., Randriamampianina, A., Bontoux, P., and Peyret, R., "Spectral Simulations of Oscillatory Convection at Low Prantl Number," Int. J. Num. Meth. Fluids, 1989 (in press).

Queeckers, P., Dupin, J. C., and Legros, J. C., "Influence of Surface Viscosity on Marangoni Benard Instabilities," in *Proceedings of 1989 National Heat Transfer Conference*, Volume 107, 1989, pp. 405-411.

Raake, D., Siekmann, J., and Chun, Ch-H., "Temperature and Velocity Fields due to Surface Tension Driven Flow," Experiments in Fluids 7, 164-172 (1989).

Ratke, L., "Immiscible Alloys under Microgravity Conditions," in *Proceedings of XXVII COSPAR Conference*, 1988, Adv. Space Res., 1988 (submitted).

Ratke, L., "Simultaneous Sedimentation by Stokes and Marangoni Motion," J. Colloid & Interface Sci., 1988 (submitted).

Sanz, A. and Perales, J. M., "Liquid Bridge Formation," Appl. Micro. Res. 2(3), 133 (1989).

Sanz, A. and Lopez-Diez, J., "Non-axisymmetric Oscillations of Liquid Bridges," J. Fluid Mech. 205, 503-521 (1989).

Schneider, S., "Influence of the Prandtl Number on Laminar Natural Convection in a Cylinder Caused by G-Jitter," *J. Cryst. Growth*, 1989 (in press).

Schwabe, D. and Scharmann, A., "Marangoni and Buoyant Convection in an Open Cavity under Reduced and Under Normal Gravity," Adv. Space Res., 1988 (in press).

Schwabe, D., Dupont, O., Queeckers, P., and Legros, J. C., "Experiment on Marangoni-Benard Instability Problems under Normal and Microgravity Conditions," Appl. Micro. Res., 1989 (submitted).

Siekmann, J. and Schilling, U., "On the Vibrations of an Inviscid Liquid Droplet Contacting a Solid Wall in a Low-Gravity Environment," Appl. Micro. Tech. 2(1), 17-26 (1989).

Szymczyk, J., "Note on the Calculation of the Migration Speed of a Fluid Particle in a Temperature Gradient," Appl. Micro. Tech. 2(1), 49-51 (1989).

Szymczyk, J. and Siekmann, J., "Numerical Calculation of the Thermocapillary Motion of a Bubble under Microgravity," Chem. Engr. Comm. 69, 129-147 (1989).

Szymczyk, J. and Janusz, A., "Note on the Calculation of the Migration Speed of a Fluid Particle in a Temperature Gradient," Appl. Micro. Tech. II-1, 49-51 (1989).

Szymczyk, J. A. and Siekman, J., "Marangoni and Buoyant Convection in a Cylindrical Cell under Normal Gravity," in *Proceedings of 7th Physicochemical Hydrodynamics Conference*, Cambridge, MA, 1989 (in press).

Velarde, M. G. and Chu, X. L., "The Harmonic Oscillator Approximation to Sustained Gravity-Capillary (Laplace) Waves at Liquid Interfaces," Phys. Lett. A 131, 430-432 (1988).

Velarde, M. G. and Chu, X-L., "Sustained Transverse and Longitudinal Waves at the Open Surface of a Liquid," Physicochem. Hydrodyn. 10, 727-737 (1988).

Velarde, M. G. and Chu, X-L., "Transverse (Laplace) and Longitudinal (Marangoni) Waves at Liquid Interfaces," in *Physicochemical Hydrodynamics: Interfacial Phenomena* (M.G. Velarde, ed.), Plenum Press, 1988, pp. 183-187.

Velarde, M. G. and Chu, X-L., "Waves and Turbulence at Interfaces," Physica Scripta T 25, 231-237 (1989).

Velarde, M. G. and Chu, X-L., "Dissipative Hydrodynamic Oscillators. I. Marangoni Effect and Sustained Longitudinal Waves at the Interfaces of Two Liquids," Il Nuovo Cimento-D 11, 707-716 (1989).

Velarde, M. G. and Chu, X-L., "Waves and Instabilities at Interfaces," in *Phase Transitions in Soft Condensed Matter* (T. Riste, ed.), Plenum Press, 1989 (in press).

Villers, D. and Platten, J. K., "Thermal Convection in Superimposed Immiscible Liquid Layers," Appl. Sci. Res. 45, 145-152 (1988).

Villers, D. and Platten, J. K., "Oscillatory Marangoni Convection in Acetone: Earth Experiments and Theory," in *Proceedings of 7th European Symposium on Materials Science in Microgravity*, 1989 (in press).

Villers, D. and Platten, J. K., "Influence of Thermocapillary Convection in Low Pr Fluids," in *Proceedings of GAMM-Workshop on Numerical Simulation of Oscillatory Convection in Low Pr Fluids,"* 1989, in press.

Villers, D. and Platten, J. K., "Influence of the Interfacial Tension Gradient on Thermal Convection in Superimposed Immiscible Liquid Layers," Appl. Sci. Res., in press.

Wozniak, G., Siekmann, J., and Srulijes, J., "Thermocapillary Bubble and Drop Dynamic under Reduced Gravity - Survey and Prospects," Z. Flug. Welt. 12, 137-144 (1988).

Wozniak, G., Ehmann, M., and Siekmann, J., "Numerical and Experimental Study of the Thermocapillary Motion of Drops in Microgravity," in *Proceedings of Fourth Asian COngress on Fluid Mechanics*, Volume II, 1989, pp. D63-D66.

Wozniak, G. and Siekmann, J., "Experimental Investigation of Thermocapillary Droplet Motion in Reduced Gravity-Two Sounding Rocket Experiments," Appl. Micro. Tech. 2(3), 173 (1989).

Wozniak, G. and Siekmann, J., "Experimental Investigation of Thermocapillary Droplet Motion in Reduced Gravity Using Sounding Rocket and Simulation Liquids," Acta Astron., 1989.

Wozniak, K., Wozniak, G., and Roesgen, "Experimental Investigation of the Thermocapillary Flow Arounf a Bubble by Means of Laser-Speckle-Velocimetry," in *Proceedings of 7th European Symposium on Materials Science in Microgravity*, 1989 (in press).

Zimmerman, E. and Siekmann, J., "Experimental Investigation of the Dynamic Contact Angle," Appl. Micro. Tech. 2(2), 96-103 (1989).

Glasses and Ceramics

Gillessen, F., Herlach, D. M., and Feuerbacher, B., "Transformation Kinetics and Bulk Glass Formation of Pd-Ni-P," Z. Phys. Chem. 156, 129 (1988).

Gillessen, F. and Herlach, D. M., "Crystal Nucleation and Glass-Forming Ability of Cu-Zr in a Containerless State," Mat. Sci. Engr. 97, 147 (1988).

Gillessen, F., Herlach, D. M., and Feuerbacher, B., "Glass Formation by Containerless Solidification of Metallic Droplets in Drop Tube Experiments," J. Less-Common Metals 145, 145 (1988).

Gronert, H. W., Gillessen, F., and Herlach, D. M., "The Glass Temperatures of Variously Quenched Pd-Cu-Si Glasses," Mat. Sci. Engr. 97, 191 (1988).

Willnecker, R., Herlach, D. M., and Feuerbacher, B., "Nucleation in Bulk Undercooled Ni-base Alloys," Mat. Sci. Engr. 98, 85 (1988).

Experimental Technology, Facilities and Instrumentation

Behrle, R. J., Figgemeier, H., Danilewsky, A., and Benz, K. W., "Zonel Melting Furnace, Development and Test of a Modular Crystal Growth Facility for μg--Applications," in *Proceedings of VII European Symposium on Materials and Fluid Sciences in Microgravity*, 1989 (in press).

Hofmann, P. and Liebig, V., "Optics and Electronics of the New Holographic Interferometer Holop D-2," in *Proceedings of VII European Symposium on Materials and Fluid Sciences in Microgravity*, 1989 (in press).

Hofmann, P. and Liebig, V., "Telescience Capabilities and Operational Aspects of the Holop D-2 Facility," *40th International Astronautical Federation Congress*, 1989, Malaga, Spain, IAF-89-415.

Steinborn, W., Rosner, P., Rastog, A. K., and Loeb, H., "The EUROTUB-30 Dropshaft with Magnetic Propulsion - A New Tool for Low Cost/High Rep Experimentation in Microgravity Preparatory Programme," in *Proceedings of VII European Symposium on Materials and Fluid Sciences in Microgravity*, 1989 (in press).

Velarde, M. G. and Chu, X-L., "An Interfacial Oscillator," in *Synergetics. Order and Chaos* (M.G. Velarde, ed.), World Scientific, 1988, pp. 143-147.

C. SOVIET PROGRAM

Electronic Materials

Barta, C., Triska, A., Fendrych, F., Krcova, E., and Regel, L. L., "Directional Solidification of the $PbCl_2$-AgCl Eutectic System under Various Gravitational Conditions," in *Proceedings of VII European Symposium on Materials and Fluid Science in Microgravity*, ESA SP-295, 1989 (in press).

Baturin, N. A., Regel, L. L., Popov, A., Mateev, S., and Zakhari'ev, K., "Growth of Superion Crystals $RbAg_4I_5$ from the Melt under Microgravity," *Ninth International Conference on Crystal Growth, ICCG-9,* Sendai, Japan, 1989, p. 187 (Abstract).

Baturin, N. A., Regel, L. L., Popov, and Mateev, S., "Growth of Superionic Crystals $RbAg_4I_5$ from the Melt under Microgravity," in *Proceedings of VII European Symposium on Materials and Fluid Science in Microgravity*, ESA SP-295, 1989 (in press).

Regel, L. L., "Review of Crystal Growth Experiments in Space," *Ninth International Conference on Crystal Growth, ICCG-9,* Sendai, Japan, 1989, p. 61 (Abstract).

Regel, L. L., "Investigation of Gravity Effect on Crystal Growth, Achievements and Prospects," Acta Astron. 17, 1241-1244 (1988).

Regel, L. L., "Review of Crystal Growth Experiments in Space," in *Proceedings of VII European Symposium on Materials and Fluid Science in Microgravity*, ESA SP-295, 1989 (in press).

Regel, L. L., Shumaev, O. V., Vidensky, I. V., Safonova, I. M., Vedernicov, A. A., Melikhov, I. V., Komarov, V. F., Ivanov, A. I., and Suleiman, S., "Experiments on Crystallization of Semiconductor Materials, Eutectic Alloys and Crystal Growth from Water Solution in Microgravity," *39th International Astronautical Federation Congress*, 1988, IAF 88-363.

Regel, L.L., Baturin, N.A., Safonova, I.M., Zubenko, V.V., Telegina, I.V., Berzhatyi, V.I., Ivanov, A.I., Aleksandrov, A., Popov, A., Stoichev, N., Yaneva, S., and Stavrev, S., "The Experiments on Crystallization of Superior Conductors of Eutectic Melts and Compositional Materials in Microgravity," *40th International Astronautical Federation Congress*, 1989, IAF 89-444.

Rodot, H., Regel, L. L., Turtchaninov, A. M., "Effects of the Cntrifuge Conditions on the Crystal Growth: Case of IV-VI Semiconductors," *Ninth International Conference on Crystal Growth, ICCG-9,* Sendai, Japan, 1989, p. 179 (Abstract).

Shcherbina-Samoilova, M. B., Hartman, H., Regel, L. L., and Trnka, J., "Growth of the ZnSe Single Crystals by Chemical Transport under Microgravity," in *Proceedings of VII European Symposium on Materials and Fluid Science in Microgravity*, ESA SP-295, 1989 (in press).

Stoichev, N., Yaneva, S., Regel, L., and Safonova, I., "Eutectic Alloys Crystallization and Influence of Impurities under Microgravity," *Ninth International Conference on Crystal Growth, ICCG-9,* Sendai, Japan, 1989, p. 187 (Abstract).

Stoichev, N. N., Yaneva, S. B., Regel, L. L., and Videnskiy, I., "Eutectic Solidification of Al-Cu Alloys Influenced by Convection," Adv. Space Res. 8, 171-174 (1988).

Regel, L. L., "Analysis of Inertial Random Walk of Particles in Liquids under Microgravity Conditions," in *Proceedings of 6th European Symposium on Material Sciences under Microgravity Conditions*, ESA SP-256, 1987, pp. 593-597.

Shalimov, V. P., "Dynamics of Individual Inclusions in a Liquid Phase under Microgravity with Due Account of Vibration," in *Proceedings of VII European Symposium on Materials and Fluid Science in Microgravity*, ESA SP-295, 1989 (in press).

General Studies and Surveys

Regel, L. L., "Analysis of New Results in Space Materials Science," in *Proceedings of 6th European Symposium on Material Sciences under Microgravity Conditions*, ESA SP-256, 1987, pp. 383-388.

Regel, L. L., *Materials Science in Space, Theory-Experiments-Technology* (English Translation, J.M. Haynes, H. Rodot), Halsted Press, 1987.

Regel, L. L., "Results and Perspectives in the Field of Space Materials Science," Space Sci. Rev. 48, 169-186 (1988).

D. JAPANESE PROGRAM

Electronic Materials

Kinoshit, K. and Yamada, T., "Surface Tension of $Pb_{0.8}Sn_{0.2}Te$ Melt and the Effect of Marangoni Convection in Microgravity Crystal Growth," J. Cryst. Growth 96, 953 (1989).

Kinoshita, K., "Processing of Semiconductor Materials in Microgravity Environments," in *Collected Techniques for Processing of New Materials* (R. Yamamoto, K. Tanaka, K. Horie, and T. Makishima, eds.), R&D Planning Co., 1987, p. 835. (in Japanese).

Kodama, S., Suzuki, Y., and Ohtsuki, O., "Solution Growth Experiment of GaAs on Sounding Rocket," in *Proceedings of JASMAC-4 Conference*, JASMA, 1988, pp. 16, Abstract.

Kodama, S., Suzuki, Y., Ueda, O., and Ohtsuki, O., "GaAs Solution Growth Experiment in Microgravity," J. Cryst. Growth, 1989 (in press).

Kodama, S., Suzuki, Y., Ueda, O., and Ohtsuki, O., "Solution Growth of GaAs Crystal under Microgravity," in *Proceedings of VII European Symposium on Materials and Fluid Sciences in Microgravity*, ESA, 1989 (in press).

Kato, M., Dohi, M, Sawai, S., Tani, M., Sato, T., Gotoh, T., and Wada, N., "Gas Evaporation in Low Gravity," in *Proceedings of Fifth Space Utilization Symposium*, 1988, pp. 283-287.

Tani, M., Sato, T., Kato, M., and Wada, N., "Discharge in Low Gravity with a Drop Capsule," in *Proceedings of Grain Formation Workshop*, Volume 10, 1989, pp. 17-23.

Yamamoto, F., Yokota, T., Mizutani, T., Sawaoka, A., Saito, M., Kanbayasi, A., and Nakahata, Y., "Image Furnace Heating Test under Microgravity Using Sounding Rocket," Appl. Micro. Res. 2(3), 158 (1989).

GENERAL STUDIES AND SURVEYS

Ahlborn, H., Minster, O., and Walter, H.U., Summary Report of Materials Science and Fluid Sciences Experiments TEXUS 1 to 10, ESA, February 1989.

Campbell, G. S. (ed.), *Microgravity Program Update*, National Research Council of Canada, March 1989.

Frohberg, G., TEXUS, Summary Review of ESA-Experiments on TEXUS 13-20, February 1989.

Hale, R. R. (ed.), *Proceedings of the Second Noncontact Temperature Measurement Workshop*, January 17-19, 1989, Pasadena, CA, JPL Publication 89-16.

Vreeburg, J.P.B. (compiler), *Experiment Reports from Flight Opportunities on MASER-1 and -2 Supported by ESA*, February 1989.

Microgravity Science and Space Experiments, Selected Proceedings of First Chinese Symposium, November 1987, Beijing, China.

The Materials Processing Research Base of the Materials Processing Center, Annual Report, FY1987-1988.

Review of Pre-CoDR PACE Experiments, PACE Science Review Board Meeting, October 13, 1988, Boulder, CO.

Microgravity Research Plan - 1988, NASA, 1988.

Space Research Organization of Netherlands, Annual Report, 1988.

Commercial Missions and Users Requirements, Space Station Workshop, Issues and Recommendations Updated October 1988, NASA, 1988.

Microgravity Strategic Plan - 1988, NASA, 1989.

Microgravity Program - FY88 Annual Report, NASA, 1989.

Microgravity Combustion Science: A Program Overview, NASA TM 101424, January 1989.

Eureca I - Experiment Facilities, Materials and Fluid Sciences, ESA, February 1989.

Spacelab, European Experiment Facilities, Materials and Fluid Sciences, ESA, February 1989.

Canadian Apparatus and Capabilities for Materials Sciences in Space, May 1989

PATENTS

Barmatz, M., Gaspar, M. and Trinh, E., "Controlled Sample Orientation and Rotation in an Acoustic Levitator," Patent No. 4,777,823, October 1988.

Barmatz, M. "Acoustic Method and Apparatus for controlled Rotation and Orientation of a Levitated Object," Patent No. 4,800,756, January 1989.

Herlach, D. M., Grill, H., Warmbold, G., and Feuerbacher, B., "Vorrichtung zum Ultraschnellan Abkuhlen Flussiger Metalltropfen," Patent No. P3723996.1-24, 1987.

Herlach, D. M., Lohofer, G., and Willnecker, R., "Vorrichtung zum Behalterlosen Schmelzen von Metallen und Legierungen," Patent No. P3639973.6-34, 1986.

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA TM-4192		

4. Title and Subtitle	5. Report Date
Microgravity Science and Applications Bibliography - 1989 Revision	May 1990
	6. Performing Organization Code: EN
7. Author(s)	8. Performing Organization Report No.
	10. Work Unit No.
9. Performing Organization Name and Address: Office of Space Science and Applications, Microgravity Science and Applications Division	11. Contract or Grant No.
	13. Type of Report and Period Covered: Technical Memorandum
12. Sponsoring Agency Name and Address: National Aeronautics and Space Administration, Washington, DC 20546	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This edition of the Microgravity Science and Applications (MSA) Bibliography is a 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 supported research. It encompasses literature published but not cited in the 1988 Revision and that literature which has been published in the past year.

Subdivisions of the Bibliography include: Electronic Materials; Metals, Alloys, and Composites; Fluids, Interfaces, and Transport; Glasses and Ceramics; Biotechnology; Combustion Science; Experimental Technology, Facilities, and Instrumentation. Also included are publications from the European, Soviet, and Japanese programs.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
electronic materials protein crystal growth microgravity science and applications glasses and ceramics	Unclassified-Unlimited Subject Category 29

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	76	A05

N-305

For sale by the National Technical Information Service, Springfield, Virginia 22161

NASA-Langley, 1990