August 2005

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Experience

2000–Present	Executive Officer, Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, Minnesota
Fall 2000	Visiting Professor, Institute of Materials Science (W6), University of Erlangen-Nürnburg, Erlangen, Germany
1998–Present	Professor, Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, Minnesota
1994–1998	Associate Professor, Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, Minnesota
Spring 1996	Invited Professor, Faculté des sciences appliquées, Université Catholique de Louvain, Louvain-La-Neuve, Belgium
1988–1994	Assistant Professor, Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, Minnesota
1986–1988	Engineer, Atmospheric and Geophysical Sciences Division, Physics Department, University of California, Lawrence Livermore National Laboratory, Livermore, California

Education

1986	Ph.D. Chemical Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts
1982	M.S. Chemical Engineering Practice, Massachusetts Institute of Technology, Cambridge, Massachusetts
1981	B.S. Chemical Engineering, with Honor, California Institute of Technology, Pasadena, California

Internships and Appointments

Summer 1986	Post-Doctoral Associate, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts
Spring 1986	Instructor, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts
Summer 1981	Intern, Graduate Studies Program, Office of Research and Development, Central Intelligence Agency, Langley, Virginia
Summer 1980	Intern, Washington Internships for Students of Engineering (WISE), American Society of Engineering Education, Washington, DC
Summer 1979	Engineer, Engineering Staff, Vehicle Emissions Laboratory, General Motors Proving Grounds, Milford, Michigan

Awards and Honors

Caltech Prize Scholarships, 1977–1981

General Motors Scholarship, 1979–1981

National Science Foundation Graduate Fellowship, 1981–1984

Student Speaker Award, New England Association for Crystal Growth, 1983

Speaker, Gordon Research Conference on Crystal Growth, Summer 1988

Shell Faculty Career Initiation Award, 1988–1990

Presidential Young Investigator Award, National Science Foundation, 1990–1995

McKnight-Land Grant Professorship, University of Minnesota, 1991–1993

Lecturer, ISSCG-8, the Eighth International Summer School on Crystal Growth, Palm Springs, CA, 1992

Speaker, Gordon Research Conference on Crystal Growth, Winter 1993

Young Author Award, American Association for Crystal Growth, 1993

Fellow of the Minnesota Supercomputer Institute, University of Minnesota, 1994–Present

Speaker, Gordon Research Conference on Crystal Growth, Summer 1994

Lecturer, ISSCG IX, the Ninth International Summer School on Crystal Growth, Arnhem, The Netherlands, 1995

Neal Amundson Professorship, Department of Chemical Engineering and Materials Science, University of Minnesota, 1996

Humphrey Institute Policy Fellow, University of Minnesota, 1996–1997

Lecturer, ISSCG-10, the Tenth International Summer School on Crystal Growth, Rimini, Italy, 1998

Shell Professorship, Department of Chemical Engineering and Materials Science, University of Minnesota, 1998–2001

DAAD (Deutscher Akademischer Austauschdienst) Study Visit Award, 2000 (Declined)

Humboldt Research Award for Senior US Scientists, Alexander von Humboldt Foundation, 2000

Research featured as cover of *Crystal Growth & Design,* American Chemical Society, 2001-2002

Speaker, Gordon Research Conference on Thin Films and Crystal Growth Mechanisms, Summer 2001

Lecturer, ISSCG-12, the Twelfth International Summer School on Crystal Growth, Berlin, Germany, 2004

Professional Societies

American Association for Crystal Growth

American Ceramic Society

American Institute of Chemical Engineers

Materials Research Society

Tau Beta Pi

Selected Professional Activities

Program Committee, Editorial Subject Chairperson, and Session Chair, the Ninth American Conference on Crystal Growth (ACCG-9), August 1993.

Financial Chair, Annual Regional Symposium of the Twin Cities Section of the American Institute for Chemical Engineers, February 1994.

Institute of Technology Instructional Computing Committee, University of Minnesota, 1994–1999.

High Performance Computing Advisory Committee, University of Minnesota, 1995–1998.

Executive Committee, AACG, American Association for Crystal Growth, 1996–2006.

Organizing Committee, Scientific Committee, Proceedings Editor, and Session Chair, the 2nd International Workshop on Modelling in Crystal Growth, October 1996.

DoD Challenge Projects Allocation Board, DoD HPC Modernization Office, 1996–2000.

Associate Editor, *Journal of Crystal Growth,* 1997–Present.

Alliance Allocation Board, National Center for Supercomputing Alliance, NSF, 1997–2002.

National Resource Allocation Committee, National Science Foundation, 1997–2002.

Executive Committee, AACG/West, Western Regional Section, American Association for Crystal Growth, 1998-Present.

Review Board, Codes for the Complex, DOE/Defense Programs, ASCI Office, Sandia National Laboratories, Albuquerque, NM, April 21-22, 1999.

Program Head and Director of Graduate Studies, Scientific Computation Program, Graduate School, University of Minnesota, 1999-2001.

Program Committee, Subject Chairperson, ACCG Award Committee, the Twelfth American Conference on Crystal Growth and Epitaxy, ACCGE-12, Vail, CO, August 13-18, 2000.

Co-Chair and Proceedings Editor, the 3rd International Workshop on Modeling in Crystal Growth, October 2000.

National Science Foundation, CAREER Award Panel, CTS, November 20-21, 2000.

National Science Foundation, ITR Preproposal Evaluation Panel, February 5-6, 2001.

International Advisory Committee, the Thirteenth International Conference on Crystal Growth and Eleventh International Conference on Vapor Growth and Epitaxy (ICCG-13/ICVGE-11), Kyoto, Japan, August 2001.

International Advisory Committee, Symposium I, CIMTEC 2002, 10th International Conference on Modern Materials & Technologies, World Ceramics Conference & Forum on New Materials, Florence, Italy, July 2002.

Science Concept Review Committee (Chair), National Aeronautics and Space Administration, University of Houston, Houston, TX, August 27, 2002.

Councilor, International Organisation for Crystal Growth, 2001–Present.

Proceedings Editor, ACCGE-14, the Fourteenth American Conference on Crystal Growth and Epitaxy, Seattle, WA, August 4–9, 2002.

International Advisory Board for the 14th International Conference on Crystal Growth, associated with the 12th International Conference on Vapour Growth and Epitaxy, Grenoble, France, August 2004.

Program Co-Chair, ICCG-15, 15th International Conference on Crystal Growth, Salt Lake City, UT, August 2007.

Research Interests

- Modeling of materials processing fundamentals.
  - Growth of electronic, optical, and biological crystals.
  - Sintering phenomena and ceramics processing.
  - Polymer processing flows.
- Transport and kinetic phenomena
  - Heat transfer, especially radiation heat transfer.
  - Mass transfer.
  - Incompressible fluid flow.
  - Reaction kinetics.
  - Crystallization kinetics.
- High performance and scientific computing.
  - Efficient numerical solution of transport problems, especially by finite element methods.
  - Modeling free and moving boundary problems.
  - Computer-aided nonlinear analysis.
  - Computational fluid dynamics.
  - Parallel computing.

Refereed Journal Publications

1. E.D. Bourret, J.J. Derby, R.A. Brown, and A.F. Witt, "Segregation effects during growth of pseudo-binary systems with large liquidus-solidus separation," *Acta Astronautica* **11**(3-4), 163–171 (1984).
2. E.D. Bourret, J.J. Derby, and R.A. Brown, "Dynamics of Bridgman-Stockbarger growth of non-dilute binary alloys," *J. Crystal Growth* **71**, 587–596 (1985).
3. J.J. Derby, R.A. Brown, F.T. Geyling, A.S. Jordan, and G.A. Nikolakopoulou, "Finite element analysis of a thermal-capillary model for liquid encapsulated Czochralski growth," *J. Electrochem. Soc.* **132**(2), 470–482 (1985).
4. J.J. Derby and R.A. Brown, "A fully implicit method for simulation of the one-dimensional solidification of a binary alloy," *Chem. Eng. Sci.* **41**(1), 37–46 (1986).
5. J.J. Derby and R.A. Brown, "Thermal-capillary analysis of Czochralski and liquid encapsulated Czochralski crystal growth I. Simulation," *J. Crystal Growth* **74**, 605–624 (1986).
6. J.J. Derby and R.A. Brown, "Thermal-capillary analysis of Czochralski and liquid encapsulated Czochralski crystal growth II. Processing strategies," *J. Crystal Growth* **75**, 227–240 (1986).
7. J.J. Derby and R.A. Brown, "On the dynamics of Czochralski crystal growth," *J. Crystal Growth* **83**, 137–151 (1987).
8. L.J. Atherton, J.J. Derby, and R.A. Brown, "Radiative heat exchange in Czochralski crystal growth," *J. Crystal Growth* **84**, 57–78 (1987).

9. P.M. Gresho and J.J. Derby, "A finite element model for induction heating of a metal crucible," *J. Crystal Growth* **85**, 40–48 (1987).

10. J.J. Derby, L.J. Atherton, P.D. Thomas, and R.A. Brown, "Finite element methods for analysis of the dynamics and control of Czochralski crystal growth," *J. Scientific Computing* **2**(4), 297–343 (1987).

11. J.J. Derby and R.A. Brown, "On the quasi-steady-state assumption in modelling Czochralski crystal growth," *J. Crystal Growth* **87**, 251–260 (1988).

12. P.A. Sackinger, R.A. Brown, and J.J. Derby, "A finite element method for analysis of fluid flow, heat transfer and free interfaces in Czochralski crystal growth," *Intern. J. Numer. Meth. Fluids* **9**(4), 453–492 (1989).

13. P.D. Thomas, J.J. Derby, L.J. Atherton, R.A. Brown, and M.J. Wargo, "Dynamics of liquid-encapsulated Czochralski growth of gallium arsenide: Matching model to experiment," *J. Crystal Growth* **96**, 135–152 (1989).

14. J.J. Derby, L.J. Atherton, and P.M. Gresho, "An integrated process model for the growth of oxide crystals by the Czochralski method," *J. Crystal Growth* **97**, 792–826 (1989).

15. S. Brandon and J.J. Derby, "Internal radiative transport in the vertical Bridgman growth of semitransparent crystals," *J. Crystal Growth* **110**, 481–500 (1991).

16. J.J. Derby and Q. Xiao, "A hydrodynamic thermal-capillary model for Czochralski crystal growth: Effects of crystal rotation," in: *Proceedings of the 28th National Heat Transfer Conference,* Minneapolis, MN (July 28–31, 1991); *ASME 91-HT-38.*

17. S. Brandon and J.J. Derby, "A finite element method for internal radiative heat transfer and its application to analysis of the growth of semitransparent crystals," in: *Fundamentals of Radiation Heat Transfer,* HTD-Vol. 160, ed. by W.A. Fiveland, A.L. Crosbie, A.M. Smith, and T.F. Smith, ASME, New York, 1–16 (1991).

18. J.J. Derby and Q. Xiao, "Some effects of crystal rotation on large-scale Czochralski oxide growth: Analysis via a hydrodynamic thermal-capillary model," *J. Crystal Growth* **113**, 575–586 (1991).

19. S. Brandon and J.J. Derby, "Heat transfer in vertical Bridgman growth of oxides: Effects of conduction, convection, and internal radiation," *J. Crystal Growth* **121**, 473–494 (1992).

20. S. Brandon and J.J. Derby, "A finite element method for conduction, internal radiation, and solidification in a finite axisymmetric enclosure," *Int. J. Num. Meth. Heat Fluid Flow* **2**, 299–333 (1992).

21. Q. Xiao and J.J. Derby, "The role of internal radiation and melt convection in Czochralski oxide growth: deep interfaces, interface inversion, and spiraling," *J. Crystal Growth* **128**, 188–194 (1993).

22. Q. Xiao and J.J. Derby, "Bulk flow versus thermal-capillary models for Czochralski growth of semiconductors," *J. Crystal Growth* **129**, 593–609 (1993).

23. S. Brandon, J.J. Derby, L.J. Atherton, D.H. Roberts, and R.L. Vital, "Three-dimensional heat transfer effects during the growth of $LiCaAlF_6$ in a modified Bridgman furnace," *J. Crystal Growth* **132**, 261–279 (1993).

24. A.G. Salinger, S. Brandon, R. Aris, and J.J. Derby, "Buoyancy-driven flows of a radiatively participating fluid in a vertical cylinder heated from below," *Proc. R. Soc. Lond. A* **442**, 313–341 (1993).

25. S. Kuppurao and J.J. Derby, "Finite element formulations for accurate calculation of radiant heat transfer in diffuse-gray enclosures," *Numer. Heat Transfer, Part B: Fundamentals* **24**, 431–454 (1993).

26. A.G. Salinger, S. Brandon, R. Aris, and J.J. Derby, "Steady-state flow transitions in the radiative Rayleigh–Bénard problem: Visualizing a bifurcation diagram," *Intern. Video J. Eng. Res.* **3**, 97–109 (1993).

27. J.J. Derby, S. Brandon, A.G. Salinger, and Q. Xiao, "Large-scale numerical analysis of materials processing systems: High-temperature crystal growth and molten glass flows," *Comput. Methods Appl. Mech. Engrg.* **112**, 69–89 (1994).

28. Q. Xiao and J.J. Derby, "Heat transfer and interface inversion during the Czochralski growth of yttrium aluminum garnet and gadolinium gallium garnet," *J. Crystal Growth* **139**, 147–157 (1994).

29. A.G. Salinger, R. Aris, and J.J. Derby, "Modeling the spontaneous ignition of coal stockpiles," *AIChE J.* **40**(6), 991–1004 (1994).

30. K.G. Ayappa, S. Brandon, J.J. Derby, H.T. Davis, and E.A. Davis, "Microwave driven convection in a square cavity," *AIChE J.* **40**(7), 1268–1272 (1994).

31. A.G. Salinger, R. Aris, and J.J. Derby, "Finite element formulations for large-scale, coupled flows in adjacent porous and open fluid domains," *Intern. J. Numer. Meth. Fluids* **18**, 1185–1209 (1994).

32. J.I. Martínez-Herrera and J.J. Derby, "Analysis of capillary-driven viscous flows during the sintering of ceramic powders," *AIChE J.* **40**(11), 1794–1803 (1994).

33. A.G. Salinger, Q. Xiao, Y. Zhou, and J.J. Derby, "Massively parallel finite element computations of three-dimensional, time-dependent, incompressible flows in materials processing systems," *Comput. Methods Appl. Mech. Engrg.* **119**, 139–156 (1994).

34. J.I. Martínez-Herrera and J.J. Derby, "Viscous sintering of spherical particles via finite element analysis," *J. Am. Ceram. Soc.* **78**[3], 645–649 (1995).

35. A. Yeckel, A.G. Salinger, and J.J. Derby, "Theoretical analysis and design considerations for float-zone refinement of electronic grade silicon sheets," *J. Crystal Growth* **152**, 51–64 (1995).

36. Q. Xiao and J.J. Derby, "Three-dimensional melt flows in Czochralski oxide growth: High-resolution, massively parallel, finite element computations," *J. Crystal Growth* **152**, 169–181 (1995).

37. Y. Zhou and J.J. Derby, "The cathode design problem in electrochemical machining," *Chem. Eng. Sci.* **50**(17), 2679–2689 (1995).

38. S. Kuppurao, S. Brandon, and J.J. Derby, "Modeling the vertical Bridgman growth of cadmium zinc telluride. I. Quasi-steady analysis of heat transfer and convection," *J. Crystal Growth* **155**, 93–102 (1995).

39. S. Kuppurao, S. Brandon, and J.J. Derby, "Modeling the vertical Bridgman growth of cadmium zinc telluride. II. Transient analysis of zinc segregation," *J. Crystal Growth* **155**, 103–111 (1995).

40. Q. Xiao, A.G. Salinger, Y. Zhou, and J.J. Derby, "Massively parallel finite element analysis of coupled, incompressible flows: A benchmark computation of baroclinic annulus waves," *Intern. J. Numer. Meth. Fluids* **21**, 1007–1014 (1995).

41. S. Kuppurao, I. Tantra, and J.J. Derby, "Parallel computation of radiation view factors between two arbitrarily oriented surfaces," *Comm. Numer. Meth. Engng.* **12**, 43–50 (1996).

42. S. Kuppurao, S. Brandon, and J.J. Derby, "Analysis of interrupted growth strategies for cadmium telluride in an unseeded vertical Bridgman system," *J. Crystal Growth* **158**, 459–470 (1996).

43. Q. Xiao, S. Kuppurao, A. Yeckel, and J.J. Derby, "On the effects of ampoule tilting during vertical Bridgman growth: Three-dimensional computations via a massively parallel, finite element method," *J. Crystal Growth* **167**, 292–304 (1996).

44. A. Yeckel, J.W. Smith, and J.J. Derby, "Parallel finite element calculation of flow in a three-dimensional lid-driven cavity using the CM-5 and T3D," *Intern. J. Numer. Meth. Fluids* **24**, 1–13 (1997).

45. S. Kuppurao and J.J. Derby, "Designing thermal environments to promote convex interface shapes during the vertical Bridgman growth of cadmium zinc telluride," *J. Crystal Growth* **172**, 350–360 (1997).

46. K. Edwards and J.J. Derby, "Understanding horizontal Bridgman shelf growth of cadmium telluride and cadmium zinc telluride: I. Heat and momentum transfer," *J. Crystal Growth* **179**, 120–132 (1997).

47. K. Edwards and J.J. Derby, "Understanding horizontal Bridgman shelf growth of cadmium telluride and cadmium zinc telluride: II. Thermoelastic stresses," *J. Crystal Growth* **179**, 133–143 (1997).

48. A. Yeckel and J.J. Derby, "Parallel computation of incompressible flows in materials processing: Numerical experiments in diagonal preconditioning," *Parallel Computing* **23**, 1379–1400 (1997).

49. Y. Zhou and J.J. Derby, "Three-dimensional computations of solution hydrodynamics during the growth of potassium dihydrogen phosphate: I. Spin up and steady rotation," *J. Crystal Growth* **180**, 497–509 (1997).

50. J.J. Derby, S. Brandon, and A.G. Salinger, "On the diffusion and P_1 approximations for modeling buoyant flow of an optically thick fluid," *Intern. J. Heat Mass Transfer* **41**(11), 1405–1415 (1998).

51. J.C. Rojo, C. Marín, J.J. Derby, E. Diéguez, "Heat transfer and the external morphology of Czochralski-grown sillenite compounds," *J. Crystal Growth* **183**, 604–613 (1998).

52. H. Zhou and J.J. Derby, "Three-dimensional finite element analysis of viscous sintering," *J. Am. Ceram. Soc.* **81**[3], 533–540 (1998).

53. A. Yeckel, Y. Zhou, M. Dennis, and J.J. Derby, "Three-dimensional computations of solution hydrodynamics during the growth of potassium dihydrogen phosphate: II. Spin down," *J. Crystal Growth* **191**, 206–224 (1998).

54. V.V. Godlevsky, J.J. Derby and J.R. Chelikowsky, "*Ab Initio* Molecular Dynamics Simulations of Liquid CdTe and GaAs: Semiconducting versus Metallic Behavior," *Phys. Rev. Lett.* **81**, 4959–4962 (1998).

55. A. Yeckel and J.J. Derby, "On setting a pressure datum when computing incompressible flows," *Intern. J. Numer. Meth. Fluids* **29**, 19–34 (1999).

56. J.C. Rojo and J.J. Derby, "On the formation of rotational spoke patterns on the melt surface during Czochralski growth of molten bismuth silicon oxide," *J. Crystal Growth* **198/199**, 154–160 (1999).

57. J.C. Rojo, E. Diéguez, and J.J. Derby, "A heat shield to control thermal gradients, melt convection, and interface shape during shouldering in Czochralski oxide growth," *J. Crystal Growth* **200**, 329–334 (1999).

58. A. Yeckel, F.P. Doty, and J.J. Derby, "Effect of steady crucible rotation on segregation in high-pressure vertical Bridgman growth of cadmium zinc telluride," *J. Crystal Growth* **203**, 87–102 (1999).

59. J.J. Derby, Y.-I. Kwon, J.C. Rojo, B. Vartak, and A. Yeckel, "Finite element modeling of 3D fluid dynamics in crystal growth systems," *Int. J. Comput. Fluid Dynamics* **12**, 225–240 (1999).

60. K. Edwards, S. Brandon, and J.J. Derby, "Transient effects during the horizontal Bridgman growth of cadmium zinc telluride," *J. Crystal Growth* **206**, 37–50 (1999).

61. V.V. Godlevsky, M. Jain, J.J. Derby, and J.R. Chelikowsky, "First principles calculations of liquid CdTe at temperatures above and below the melting point," *Phys. Rev. B* **60**, 8640–8649 (1999).

62. M. Kestigian, A.B. Bollong, J.J. Derby, H.L. Glass, K. Harris, H.L. Hettich, P.K. Liao, P. Mitra, P.W. Norton, and H. Wadley, "Cadmium zinc telluride substrate growth, characterization, and evaluation," *J. Electronic Materials* **28**(6), 726-731 (1999).

63. A. Yeckel and J.J. Derby, "Effect of accelerated crucible rotation on melt composition in high-pressure vertical Bridgman growth of cadmium zinc telluride," *J. Crystal Growth* **209**, 734–750 (2000).

64. B. Vartak, Y.-I. Kwon, A. Yeckel, and J.J. Derby, "An analysis of flow and mass transfer during the solution growth of potassium titanyl phosphate," *J. Crystal Growth* **210**, 704–718 (2000).

65. V.F. de Almeida, A.M. Chapman, and J.J. Derby, "On equilibration and sparse factorization of matrices arising in finite element solutions of partial differential equations," *Numerical Methods for Partial Differential Equations* **16**, 11–29 (2000).

66. R.W. Hooper, C.W. Macosko, and J.J. Derby, "Assessing a flow-based finite element model for the sintering of viscoelastic particles," *Chem. Eng. Sci.* **55**, 5733–5746 (2000).

67. V.F. de Almeida and J.J. Derby, "Construction of solution curves for large two-dimensional computations of steady-state flows of incompressible fluids," *SIAM J. Scientific Computing* **22**(1), 285–311 (2000).

68. R.W. Hooper, V.F. de Almeida, C.W. Macosko, and J.J. Derby, "Transient polymeric drop extension and retraction in uniaxial extensional flows," *J. Non-Newtonian Fluid Mech.* **98**, 141–168 (2001).

69. H. Zhou and J.J. Derby, "An assessment of a parallel, finite element method for three-dimensional, moving-boundary flows driven by capillarity for simulation of viscous sintering," *Intern. J. Numer. Meth. Fluids* **36**, 841–865 (2001).

70. R.W. Hooper, M. Toose, C.W. Macosko, and J.J. Derby, "A comparison of boundary element and finite element methods for modeling axisymmetric polymeric drop deformation," *Intern. J. Numer. Meth. Fluids* **37**, 837–864 (2001).

71. B. Vartak and J.J. Derby, "On stable algorithms and accurate solutions for convection-dominated mass transfer in crystal growth modeling," *J. Crystal Growth* **230**, 202–209 (2001).

72. Y.-I. Kwon and J.J. Derby, "Modeling the coupled effects of interfacial and bulk phenomena during solution crystal growth," *J. Crystal Growth* **230**, 328–335 (2001).

73. J.R. Chelikowsky, J.J. Derby, V.V. Godlevsky, M. Jain, and J.Y. Raty, "Ab Initio Simulations of Liquid Semiconductors using the Pseudopotential-Density Functional Method," *J. Phys.: Condens. Matter* **13** , No 41, R817–R854, (15 October 2001).

74. A. Yeckel and J.J. Derby, "Buoyant and rotational flows in small-scale vertical Bridgman growth of cadmium zinc telluride using accelerated crucible rotation," *J. Crystal Growth* **233**, 599–608 (2001).

75. R. Hooper, V. Cristini, S. Shakya, J. S. Lowengrub, J. J. Derby, and C. W. Macosko, "Modeling multiphase flows using a novel 3D adaptive remeshing algorithm," *Adv. Fluid Mech.* **29**, 33–42 (2001).

76. M. Jain, V.V. Godlevsky, J.J. Derby, and J.R. Chelikowsky, "First principles simulations of liquid ZnTe," *Phys. Rev. B* **65**, 035212 (2002).

77. P. Sonda, A. Yeckel, P. Daoutidis, and J.J. Derby, "Improved radial segregation via the destabilizing vertical Bridgman configuration," *J. Crystal Growth* **260,** 263–276 (2003).

78. A. Yeckel and J.J. Derby, "Dynamics of three-dimensional convection in microgravity crystal growth: g-jitter with steady magnetic fields," *J. Crystal Growth* **263**, 40–52 (2004).

79. A. Yeckel, G. Compère, A. Pandy, and J.J. Derby, "Three-dimensional imperfections in a model vertical Bridgman growth system for cadmium zinc telluride," *J. Crystal Growth* **263**, 629–644 (2004).

80. P. Sonda, A. Yeckel, P. Daoutidis, and J.J. Derby, "Development of model-based control for Bridgman crystal growth," *J. Crystal Growth* **266**, 182–189 (2004).

81. C.J. Gadgil, A. Yeckel, J.J. Derby, and W.-S. Hu, "A diffusion-reaction model for DNA microarray assays," *J. Biotechnology* **114,** 3145 (2004).

82. S. V. Bykova, V. D. Golyshev, M. A. Gonik, V. B. Tsvetovsky, V. I. Deshko, A. Ya. Karvatskii, A.V. Lenkin, S. Brandon, O. Weinstein, A. Virozub, J.J. Derby, A. Yeckel, P. Sonda, "Experimental and numerical analysis of coupled interfacial kinetics and heat transport during the Axial Heat flux close to the Phase interface (AHP) growth of BGO single crystals," *J. Crystal Growth* **266,** 246–256 (2004).

83. A. Yeckel and J.J. Derby, "Feasibility study of cadmium zinc telluride growth using a submerged heater in a Bridgman system," *J. Electronic Materials* **33,** 488–497 (2004).

84. P. Sonda, A. Yeckel, P. Daoutidis, and J.J. Derby, "Hopf bifurcation and solution multiplicity in a model for destabilized Bridgman crystal growth," *Chem. Eng. Sci.* **60,** 1323–1336 (2005).

85. A. Pandy, A. Yeckel, M. Reed, C. Szeles, M. Hainke, G. Müller, and J.J. Derby, "Analysis of the growth of cadmium zinc telluride in an electrodynamic gradient freeze furnace via a self-consistent, multi-scale numerical model," *J. Crystal Growth* **276,** 133–147 (2005).

86. P. Sonda, A. Yeckel, J.J. Derby and P. Daoutidis, "The Feedback Control of the Vertical Bridgman Crystal Growth Process by Crucible Rotation: Two Case Studies," *Comp. Chem. Engng.* **29,** 887–896 (2005).

87. B. Vartak, A. Yeckel, and J.J. Derby, "Time-dependent, three-dimensional flow and mass transport during solution growth of potassium titanyl phosphate," *J. Crystal Growth* **281,** 391–406 (2005).

88. B. Vartak, A. Yeckel, and J.J. Derby, "On the validity of boundary layer analysis for flow and mass transfer caused by rotation during the solution growth of large, single crystals," *J. Crystal Growth* **283,** 479–489 (2005).

89. A. Yeckel, A. Pandy, and J.J. Derby, "Fixed-point convergence of modular, steady-state heat transfer models coupling multiple scales and phenomena for melt crystal growth," *Int. J. Numer. Meth. Engng.* submitted (2005).

90. E. Ko, M. Alemany, J.J. Derby, and J.R. Chelikowsky, "*Ab initio* simulations of non-stoichiometric Cd_xTe_{1-x} liquids," *J. Chem. Phys.* in press (2005).

91. L. Lun, A. Yeckel, P. Daoutidis, and J.J. Derby, "Ampoule tilting on dopant segregation in cadmium zinc telluride grown via the vertical Bridgman method," *J. Crystal Growth* to be submitted (2005).

92. L. Lun, A. Yeckel, P. Daoutidis, and J.J. Derby, "Gradient effects on interface shape of cadmium zinc telluride grown in an EDG furnace," *J. Crystal Growth* to be submitted (2005).

93. H. Djohari, J.I. Martínez-Herrera, and J.J. Derby, "A mechanistic explanation for neck growth and densification via the volume diffusion of crystalline vacancies during sintering," *J. Am. Ceram. Soc.,* in preparation.

94. H. Djohari and J.J. Derby, "Finite element analysis of sintering via surface vacancy diffusion," *J. Am. Ceram. Soc.,* in preparation.

95. B. Dai and J.J. Derby, "Prediction of step-train instabilities in solution crystal growth via linear stability and hydrodynamics analyses," *J. Crystal Growth* in preparation.

Invited Publications and Book Chapters

1. J.J. Derby, "Theoretical modeling of Czochralski crystal growth," *MRS Bulletin* **XIII**(10), 29–35 (1988).

2. J.J. Derby, "An overview of convection during the growth of single crystals from the melt," in: *Proceedings of the Eighth International Summer School on Crystal Growth, ISSCG-8,* Palm Springs, CA (1992).

3. J.J. Derby, S. Brandon, A.G. Salinger, and Q. Xiao, "Large-scale numerical analysis of materials processing systems: High-temperature crystal growth and molten glass flows," *Comput. Methods Appl. Mech. Engrg.* **112**, 69–89 (1994).*

4. Q. Xiao, A.G. Salinger, Y. Zhou, and J.J. Derby, "Massively Parallel Finite Element Analysis of Large-Scale Crystal Growth Processes: Rotating and Coupled Flows," *Extended Abstracts of the 2nd Japan-U.S. Symposium on Finite Element Methods in Large-Scale Computational Fluid Dynamics,* Chuo University, Tokyo, Japan (March 14–16, 1994).

5. A.G. Salinger, Q. Xiao, Y. Zhou, and J.J. Derby, "Massively parallel finite element computations of three-dimensional, time-dependent, incompressible flows in materials processing systems," *Comput. Methods Appl. Mech. Engrg.* **119**, 139–156 (1994).*

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11. A. Yeckel and J.J. Derby, "Parallel computation of incompressible flows in materials processing: Numerical experiments in diagonal preconditioning," *Parallel Computing* **23**, 1379–1400 (1997).*

12. J.J. Derby, "Modeling transient and three-dimensional fluid flow and transport phenomena during the growth of electronic crystals," in: *Advances in Computational Engineering Science,* Eds. S.N. Atluri and G. Yagawa (Tech Science Press, Forsyth, GA, 1997) pp. 220–225.

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27. A. Yeckel and J.J. Derby, "Feasibility study of cadmium zinc telluride growth using a submerged heater in a Bridgman system," *J. Electronic Materials* **33,** 488–497 (2004).*

28. J.J. Derby and A. Yeckel, "Modeling of Crystal Growth Processes," in: *Crystal Growth — From Fundamentals to Technology,* Eds. G. Müller, J.-J. Métois, and P. Rudolph, Elsevier, Amsterdam (2004) pp. 143–167.

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*Denotes a manuscript also listed as a refereed journal publication.

Other Publications

1. J.J. Derby and A. Tugendhat, "The 1980 WISE program from the student perspective," *1981 ASEE Annual Conference Proceedings,* Los Angeles, CA (1981).

2. J.E. Scott and J.J. Derby, "Thin film coal liquid evaporation," *ORNL/MIT 357,* Oak Ridge National Laboratory, Oak Ridge, TN, May (1983).

3. B.E. Thompson, J.J. Derby, and E.H. Stalzer, "Vapor-liquid equilibrium of the $Mg(NO_3)_2$–HNO_3–H_2O system," *ORNL/MIT 360,* Oak Ridge National Laboratory, Oak Ridge, TN, June (1983).

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6. P.M. Gresho and J.J. Derby, "Solution of the time-harmonic semi-Maxwell equations for induction heating using FIDAP," *UCRL–97322,* Lawrence Livermore National Laboratory, Livermore, CA, November (1987).

7. R.A. Brown, P.A. Sackinger, P.D. Thomas, J.J. Derby, and L.J. Atherton, "Application of large-scale simulation to intelligent materials processing: Modelling of Czochralski growth of single crystals," in *Interdisciplinary Issues in Materials Processing and Manufacturing,* Volume 1, ed. by S. K. Samanta, R. Komanduri, R. McMeeking, M. M. Chen, and A. Teng, ASME, New York, 331–348 (1987).

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10. J.J. Derby, "Massively parallel finite element analysis of materials manufacturing: Crystal growth processes," *AHPCRC Bulletin* **4**(2), 11–13 (Spring 1994).

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12. J.J. Derby, Review of *Numerical Methods for Problems with Moving Fronts,* by B.A. Finlayson, Ravenna Park Publishing, Seattle, WA, 1992, in: *AIChE J.* **41**(10), 2342–2343 (1995).

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16. V.F. de Almeida and J.J. Derby, "Preferred Method for Setting a Pressure Level in Computations of 3-D Flows of Incompressible Fluids with GFEM," University of Minnesota Supercomputing Institute Research Report, *UMSI 99/5,* January (1999).

17. V. Godlevsky, M. Jain, J.R. Chelikowsky, and J. Derby : "First Principles Simulations of Liquid II-VI Semiconductors: Semiconducting versus Metallic Behavior," Bull. APS **44**, 1340 (1999).

18. Featured in: "From the Ground Up: Building a Solid Foundation for Microgravity Research," *Microgravity News* **6** (3), pp. 1, 13-18 (Fall 1999).

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20. M. Jain, V. Godlevsky, J. Derby, and J.R. Chelikowsky: "*Ab Initio* Simulations of Liquid HgTe: Electronic and Structural Properties," Bull. APS **45**, 82 (2000).

21. A. Yeckel, V.F. de Almeida, and J.J. Derby, "Theoretical Analysis of 3D, Transient Convection and Segregation in Microgravity Bridgman Crystal Growth," in: *Space Technology & Applications International Forum,* Ed. M.S. El-Genk, AIP Conference Proceedings, Melville, New York, 884-889 (2000).

22. A. Yeckel and J.J. Derby, "Suppressing Convection in Bridgman Crystal Growth: Effects Of Microgravity, Magnetic Fields, and Crucible Rotation," in: *Proceedings of the International Conference on Computational Engineering & Sciences,* Los Angeles, California (2000).

23. H. Zhou and J.J. Derby, "Parallel Implementation of Finite Element Method with MPI: Application to Three-Dimensional Free Surface Stokes Flow," in: *Proceedings of the 2000 International Conference on Parallel and Distributed Processing Techniques and Applications,* Las Vegas, NV (June 26–29, 2000).

24. J.J. Derby, Y.-I. Kwon, J.C. Rojo, B. Vartak, and A. Yeckel, "Three-dimensional computations of transport and growth for crystal growth systems", in: *Proceedings of IMECE 2000*, 2000 International Mechanical Engineering Congress and Exposition, Orlando, FL (November 5–10, 2000).

25. J.J. Derby and A. Yeckel, "Buoyant and rotational flows during ACRT vertical bridgman crystal growth", in: *Proceedings of IMECE 2000*, 2000 International Mechanical Engineering Congress and Exposition, Orlando, FL (November 5–10, 2000).

26. P. Sonda, A. Yeckel, P. Daoutidis, and J.J. Derby, "Complex dynamics within the vertical Bridgman crystal growth process," in: *Proceedings of the IFAC Symposium: DYCOPS 6*, 6th Symposium on the Dynamics and Control of Process Systems, Cheju Island, Korea (June 4–6, 2001).

27. R. Hooper, V. Cristini, S. Shakya, J.S. Lowengrub, J.J. Derby, and C.W. Macosko, "Modeling multiphase flows using a novel 3D adaptive remeshing algorithm," in: *Proceedings of the First International Conference on Computational Methods in Multiphase Flow,* Orlando, FL (14-16 March 2001).

28. J.J. Derby, A. Pandy, P. Sonda, B. Vartak, A. Yeckel, and P. Daoutidis, "Representing Realistic Complexity in Numerical Models of Crystal Growth: Three-Dimensional and Time-Dependent Flows, Phase Boundaries, and Furnaces," in: *Proceedings of the International FORTWIHR Conference 2001,* Erlangen, Germany (March 12–14, 2001).

29. J.J. Derby, B. Vartak, Y.-I. Kwon, A. Pandy, A. Yeckel, M. Hainke, and G. Müller, "Multi-scale Numerical Models of Crystal Growth Systems," in: *Proceedings of ICES '01, International Conference on Computational Engineering Science,* Puerto Vallarta, Mexico (August 19-25, 2001).

30. V. Prasad, A. Yeckel, J.J. Derby, Preface to the Proceedings of the Third International Workshop on Modeling in Crystal Growth, *J. Crystal Growth* **230**, x–xi (2001).

31. J.J. Derby, G. Kowach, R. Scripa, A. Yeckel, Editors' Preface to the Proceedings of the Fourteenth American Conference on Crystal Growth and Epitaxy, *J. Crystal Growth* **250**, xiii (2003).

32. H. Djohari and J.J. Derby, "A finite element model for the sintering of crystalline particles via vacancy diffusion," in: *Proceedings of Sintering 2003, An International Conference on the Science, Technology & Applications of Sintering,* State College, PA (September 15–17, 2003).

33. P. Sonda, A. Yeckel, J.J. Derby, and P. Daoutidis, "Suppression of flow oscillations in a vertical Bridgman crystal growth system," in: *Proceedings of the 2004 American Control Conference,* Boston, MA (June 30–July 2, 2004).

34. B. Dai, Y.-I. Kwon, and J.J. Derby, "Analysis of flow-induced, step-bunching instabilities during the growth of crystals from liquid solutions," in: *Proceedings of ICTAM 2004, The XXI International Congress of Theoretical and Applied Mechanics,* Warsaw, Poland (August 15–21, 2004).

35. A. Yeckel and J.J. Derby, "Convective heat and mass transport in novel Bridgman configurations," in: *Proceedings of ICTAM 2004, The XXI International Congress of Theoretical and Applied Mechanics,* Warsaw, Poland (August 15–21, 2004).

Invited Presentations

1. "Heat Transfer, Stability, and Dynamics of the Czochralski and Liquid Encapsulated Czochralski Processes," Department of Chemical Engineering, University of Texas, Austin, TX, February 1986.

2. "Heat Transfer, Stability, and Dynamics of the Czochralski and Liquid Encapsulated Czochralski Processes," Exxon Production Research Company, Houston, TX, February 1986.

3. "Heat Transfer, Stability, and Dynamics of the Czochralski and Liquid Encapsulated Czochralski Processes," Chevron Oil Field Research Company, La Habra, CA, February 1986.

4. "Heat Transfer, Stability, and Dynamics of the Czochralski and Liquid Encapsulated Czochralski Processes," Department of Chemical Engineering, University of Illinois, Urbana, IL, March 1986.

5. "Heat Transfer, Stability, and Dynamics of the Czochralski and Liquid Encapsulated Czochralski Processes," IBM, East Fishkill Facility, NY, March 1986.

6. "Heat Transfer, Stability, and Dynamics of the Czochralski and Liquid Encapsulated Czochralski Processes," Department of Chemical Engineering, University of Michigan, Ann Arbor, MI, March 1986.

7. "Heat Transfer, Stability, and Dynamics of the Czochralski and Liquid Encapsulated Czochralski Processes," Lawrence Livermore National Laboratory, Livermore, CA, April 1986.

8. "Finite Element Analysis of Czochralski Growth of Semiconductor and Oxide Crystals," Departmental Seminar, Department of Chemical Engineering, University of California at Davis, Davis, CA, November 2, 1987.

9. "An Integrated Process Model for the Czochralski Growth of Oxide Crystals," Department of Chemical Engineering, Purdue University, West Lafayette, IN, February 15, 1988.

10. "An Integrated Process Model for the Czochralski Growth of Oxide Crystals," Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, MN, February 16, 1988.

11. "Theoretical Modeling of Czochralski Crystal Growth," Gordon Research Conference on Crystal Growth, Plymouth State College, New Hampshire, Summer 1988.

12. "Analysis of Czochralski Growth of Oxide Crystals," GE Seminar Series, Department of Chemical Engineering, University of Massachusetts, Amherst, MA, November 1988.

13. "Navier–Stokes Dynamics and Reacting and Convective Flows," (with G. Sell), DARPA Defense Sciences Summer Conference, La Jolla, CA, July 1989.

14. "Modeling Czochralski Crystal Growth Processes," Army Research Office, Triangle Park, NC, September 13, 1989.

15. "Analysis of an inductively-heated Czochralski crystal growth process," Departmental Seminar, School of Chemical Engineering, Cornell University, Ithaca, NY, September 26, 1989.

16. "A Finite Element Analysis of the Czochralski Growth of Oxide Crystals," Departmental Seminar, Department of Aerospace Engineering and Mechanics, University of Minnesota, October 13, 1989.

17. "Dynamics in Materials Processing: Outstanding Problems in Melt Crystal Growth," IMA Workshop on Patterns and Dynamics in Reactive Media, Institute for Mathematics and Its Applications, University of Minnesota, October 20, 1989.

18. "Chemical Engineering and Materials Processing: Analysis of Melt Crystal Growth Systems," Departmental Seminar, Chemistry Department, St. John's University, Collegeville, MN, April 26, 1990.

19. "Theoretical Analyses of Melt Growth of Oxide Crystals," Corporate Research and Development, E.I. Du Pont De Nemours & Company, Wilmington, DE, December 18, 1990.

20. "Coupled Transport and Reaction in Chemical Engineering and Materials Processing Systems: Present and Possible Future Methodologies," U.S. Army Ballistic Research Laboratory, Aberdeen Proving Ground, MD, December 19, 1990.

21. "On Modeling Three-Dimensional Flow Transitions in Czochralski Crystal Growth," AHPCRC Seminar on Dynamics and Flow Systems, Minneapolis, MN, January 23, 1990.

22. "Macroscopic interactions of viscous flow, heat transfer, and solidification interfaces in melt crystal growth systems: Oxides and fluorides," IMA Workshop on Free Boundaries in Viscous Flows, Institute for Mathematics and Its Applications, University of Minnesota, March 11–15, 1991.

23. "A Framework for Numerical Solution of Viscous Free-Surface Flows," (presented by Robert A. Brown, with J. Derby, P. Sackinger, K. Tsiveriotis, and D. Rajagopalan), IMA Workshop on Free Boundaries in Viscous Flows, Institute for Mathematics and Its Applications, University of Minnesota, March 11–15, 1991.

24. "Computer-Aided Analyses of Internal Radiation and Convection: Applications to Crystal Growth and Glass Processing," Laser Division Seminar Series, Lawrence Livermore National Laboratory, Livermore, CA, September 17, 1991.

25. "Computer-Aided Analyses of Internal Radiation, Conduction, and Convection in Crystal Growth Processes," James and Catherine Patten Seminar Series, Department of Chemical Engineering, University of Colorado at Boulder, Boulder, CO, September 19, 1991.

26. "Convection Effects in the Growth of Single Crystals," ISSCG-8, the Eighth International Summer School on Crystal Growth, Palm Springs, CA, August 9–15, 1992.

27. "Finite Element Methods for CFD in Chemical Engineering: Materials Processing Applications," US-Japan Symposium on Finite Element Methods in Large-Scale Computational Fluid Dynamics, Minnesota Supercomputer Institute and Army High Performance Computing Research Center, Minneapolis, MN, October 12–14, 1992.

28. "A Preview of Research Results in Crystal Growth, Radiation Heat Transfer, and Ceramics Sintering," Coating Process Fundamentals/Capillary Hydrodynamics/Allied Research Seminar Series, Department of Chemical Engineering and Materials Science, University of Minnesota, Minneapolis, MN, October 19, 1992.

29. "A Continuum Finite Element Model for Sintering," (presented by J.I. Martínez-Herrera), the 45th Pacific Coast Regional Meeting of The American Ceramic Society, San Francisco, CA, November 1–6, 1992.

30. "Theoretical analyses of the melt growth of oxide crystals," Departmental Seminar, Graduate School of Science and Engineering, Waseda University, Tokyo, Japan, December 15, 1992.

31. "On modeling fluid dynamics in materials processing using finite element methods," ICES '92, International Conference on Computational Engineering Science, Hong Kong, December 17–22, 1992.

32. "Large-scale computational modeling of bulk crystal growth processes," 1993 Winter Gordon Research Conference on Crystal Growth, Casa Sirena Marina Resort, Oxnard, CA, March 15–19, 1993.

33. "Computer-Aided Analyses of High-Temperature Materials Processing Systems: Crystal Growth and Ceramics Sintering," Departmental Seminar Series, Department of Chemical Engineering, University of Wisconsin, Madison, WI, April 15, 1993.

34. "Finite element analysis of the growth of semitransparent crystals via the Bridgman method," Workshop on Control of Bridgman Growth of CdZnTe Crystals, School of Engineering & Applied Science, University of Virginia, Charlottesville, VA, June 24–25, 1993.

35. "On modeling flows in materials processing via high performance computing: I. Viscous sintering, II. Massively parallel finite element computations," Transport Phenomena and Materials Processing Seminar Series, Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, MA, July 23, 1993.

36. "Finite Element Analysis of the Growth of Large, Single Crystals of Refractory Oxides," ARO Research/Technology Transfer Workshops in High Performance Computing: Advanced Manufacturing, TARDEC, Warren, MI, August 30–31, 1993.

37. "Computer-Aided Analyses of High-Temperature Materials Processing Systems: Crystal Growth and Ceramics Sintering," Chemical Engineering Program Seminar Series, Department of Applied Mechanics and Engineering Sciences, University of California at San Diego, La Jolla, CA, September 15, 1993.

38. "Finite Element Analysis of the Growth of Large, Single Crystals of Semitransparent Materials," Infrared Devices Laboratory, Central Research Laboratories, Texas Instruments, Dallas, TX, September 16, 1993.

39. "Computer-Aided Analyses of High-Temperature Materials Processing Systems: Crystal Growth and Ceramics Sintering," Departmental Seminar Series, Department of Chemical Engineering, University of California at Berkeley, Berkeley, CA, September 20, 1993.

40. "Computer-Aided Analyses of Ceramics Sintering and Solution Crystal Growth," Laser Division Seminar Series, Lawrence Livermore National Laboratory, Livermore, CA, September 21, 1993.

41. "An Overview of Research Topics related to High-Performance Computing and Environmental Science: Coal Stockpile Ignition, Combustion, Porous Media, and Deep-Well Oxidation," ARO Workshop on HPC Issues in Environmental Sciences, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS, September 28–29, 1993.

42. "Parallel finite element computations of melt crystal growth flows," Symposium on Parallel Element Computations, Minnesota Supercomputer Institute, Minneapolis, MN, October 25–27, 1993.

43. "Analysis of Flows in High-Temperature Crystal Growth Processes via Finite Element Methods," 2nd Japan-US Symposium on Finite Element Methods in Large-Scale Computational Fluid Dynamics, Chuo University, Tokyo, Japan, March 14–16, 1994.

44. "Massively Parallel Finite Element Analyses of Rotational and Buoyant Flows in Crystal Growth Systems," Institute of Industrial Science, University of Tokyo, Tokyo, Japan, March 17, 1994.

45. "Panel discussion on the future of crystal growth research," 1994 Gordon Research Conference on Crystal Growth, Proctor Academy, Andover, NH, June 27–July 2, 1994.

46. "Computer-Aided Analyses of High-Temperature Materials Processing Systems: Crystal Growth and Ceramics Sintering," Sandia National Laboratories, July 25, 1994.

47. "Massively Parallel Finite Element Calculations of Coupled Incompressible Flows and their use for Materials Processing Research," AHPCRC - ARL Joint Conference on Computational Fluid Mechanics and Structural Mechanics, Army Research Laboratory, Aberdeen, MD, December 14–16, 1994.

48. "Modeling the Growth of Bulk Single Crystals via High Performance Computing," Departmental Seminar Series, Department of Chemical Engineering, University of California at Los Angeles, Los Angeles, CA, March 10, 1995.

49. "Modeling the Growth of Bulk Single Crystals via High Performance Computing," the American Ceramic Society 1995 Annual Meeting and Exposition, Cincinnati, OH, April 30–May 4, 1995.

50. "Computational materials research at the University of Minnesota and the Army HPC Research Center," Ceramics and Metals Division, U.S Army Research Laboratory – Materials Directorate, Watertown, MA, May 31, 1995.

51. "Macroscopic transport processes during the growth of single crystals from the melt," ISSCG-IX, the Ninth International Summer School on Crystal Growth, Papendal, Arnhem, the Netherlands, June 11–16, 1995.

52. "Large-scale numerical modeling of bulk crystal growth from the melt and solution," ISSCG-IX, the Ninth International Summer School on Crystal Growth, Papendal, Arnhem, the Netherlands, June 11–16, 1995.

53. "Modeling the growth of bulk single crystals via high performance computing," Departmental Seminar, Centre d'Ingénierie des Systèmes, d'Automatique et de Mécanique Appliquée, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, June 16, 1995.

54. "Modeling the growth of CdTe and CdZnTe bulk single crystals via high performance computing," DIGIRAD, San Diego, CA, December 18, 1995.

55. "HPC analysis of materials processing," AHPCRC Infrastructure Support Scientists Workshop, U.S. Army Research Laboratory, Aberdeen Proving Ground, MD, February 26–27, 1996.

56. "Analysis of materials processing via high performance computing: From food processing to the growth of photo-electronic crystals," U.S. Army Research, Development and Engineering Center, Natick, MA, February 28, 1996.

57. "Analysis of materials processing via high performance computing: From photo-electronic crystals to food," Department of Engineering, Clark Atlanta University, Atlanta, GA, March 21, 1996.

58. "Modeling the growth of bulk single crystals via high performance computing," Third US-Japan Symposium on Finite Element Methods in Large-Scale Computational Fluid Dynamics, Minnesota Supercomputer Institute and Army High Performance Computing Research Center, Minneapolis, MN, April 1–3, 1996.

59. "An Overview of Continuum Transport Phenomena and the Growth of Large, Single Crystals," Centre d'Ingénierie des Systèmes, d'Automatique et de Mécanique Appliquée, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, April 30, 1996.

60. "Modeling the Melt Growth of Oxide Single Crystals: Understanding the Effects of Internal Radiation and Convection," Centre d'Ingénierie des Systèmes, d'Automatique et de Mécanique Appliquée, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, May 8, 1996.

61. "Modeling the Growth of Bulk Single Crystals via High Performance Computing," Laboratoire d'Etude de la Solidification, Centre d'Etude Nucléaire de Grenoble, Grenoble, France, May 14, 1996.

62. "Modeling the Growth of Bulk Single Crystals via High Performance Computing," Department of Physics of Materials, Universidad Autónoma de Madrid, Madrid, Spain, May 17, 1996.

63. "Fundamentals of Radiation Heat Transfer I," Centre d'Ingénierie des Systèmes, d'Automatique et de Mécanique Appliquée, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, May 23, 1996.

64. "Fundamentals of Radiation Heat Transfer II," Centre d'Ingénierie des Systèmes, d'Automatique et de Mécanique Appliquée, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, May 29, 1996.

65. "Toward the Development of Massively Parallel Finite Element Algorithms and their Application to Problems in Materials Processing: From Photo-electronic Crystals to Food," Centre d'Ingénierie des Systèmes, d'Automatique et de Mécanique Appliquée, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, June 5, 1996.

66. "Modeling the Bridgman Growth of Cadmium Zinc Telluride: Toward Understanding Process Yield and Crystal Quality," Centre d'Ingénierie des Systèmes, d'Automatique et de Mécanique Appliquée, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, July 2, 1996.

67. "Useful Techniques (some new, some old) for Large-Scale Numerical Analysis of Continuum Transport Phenomena," Centre d'Ingénierie des Systèmes, d'Automatique et de Mécanique Appliquée, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, July 5, 1996.

68. "Finite Element Analysis of Ceramics Sintering Processes," Centre d'Ingénierie des Systèmes, d'Automatique et de Mécanique Appliquée, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, July 9, 1996.

69. "Modeling the Growth of Bulk Single Crystals via High Performance Computing," Institut für Werkstoffwissenschaften, Universität Erlangen — Nürnberg, Erlangen, Germany, July 16, 1996.

70. "Modeling the Growth of Bulk Single Crystals via High Performance Computing," Institut für Kristallzüchtung, Berlin, Germany, July 18, 1996.

71. "New Vistas for Fluid Flow and Thermal Modeling in Bulk Crystal Growth: Transient and Three-Dimensional Phenomena," ACCG-10/ICVGE-9, Tenth American Conference on Crystal Growth/Ninth International Conference on Vapor Growth & Epitaxy, Vail, CO, August 8, 1996.

72. "An Overview of Continuum Transport Phenomena during the Growth of Large, Single Crystals," Supervisão de Materiais Optoelectrônicos, Instituto de Pesquisas Energéticas e Nucleares, São Paulo, Brazil, September 23, 1996.

73. "Modeling the Melt Growth of Oxide and Fluoride Single Crystals: Understanding the Effects of Internal Radiation and Convection," Supervisão de Materiais Optoelectrônicos, Instituto de Pesquisas Energéticas e Nucleares, São Paulo, Brazil, September 24, 1996.

74. "Modeling the Bridgman Growth of Cadmium Zinc Telluride: Toward Understanding Process Yield and Crystal Quality," Supervisão de Materiais Optoelectrônicos, Instituto de Pesquisas Energéticas e Nucleares, São Paulo, Brazil, September 25, 1996.

75. "Modeling the Growth of Bulk Single Crystals via High Performance Computing," Instituto de Física de São Carlos, Universidade de São Paulo, São Carlos, Brazil, September 27, 1996.

76. "Heat Transfer and Fluid Dynamics during the Czochralski Growth of Oxide Single Crystals," Cristallogenèse, Ecole Polytechnique Fédérale De Lausanne, Lausanne, Switzerland, October 10, 1996.

77. "Modeling the Growth of Bulk Single Crystals via High Performance Computing," Department of Mechanics, Ecole Polytechnique Fédérale De Lausanne, Lausanne, Switzerland, October 11, 1996.

78. "Modeling the heat transfer, hydrodynamics, and thermal stresses during the horizontal Bridgman growth of CdZnTe," II-VI Incorporated, Saxonburg, PA, December 10, 1996.

79. "Modeling the Growth of Bulk Single Crystals via High Performance Computing," MEMC Electronic Materials, Inc., St. Peters, MO, February 3, 1997.

80. "Analysis of Materials Processing via High Performance Computing: From Photo-Electronic Crystals to Food," 1997 AHPCRC Infrastructure Support Scientists Workshop U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi February 26, 1997.

81. "Modeling Transient and Three-dimensional Fluid Flow and Transport Phenomena during the Growth of Electronic Crystals," International Conference on Computational Engineering Science (ICES '97), San Jose, Costa Rica, May 4–9, 1997.

82. "Experiments with a Robust Parallel Nonlinear Algorithm for Analysis of 3-D Equations of Incompressible Steady-State Flows," (presented by V.F. de Almeida), International Conference on Computational Engineering Science (ICES '97), San Jose, Costa Rica, May 4–9, 1997.

83. "Parallel Computation of Three-Dimensional, Time-Dependent Hydrodynamics during Solution Crystal Growth," (presented by A.J. Yeckel), International Conference on Computational Engineering Science (ICES '97), San Jose, Costa Rica, May 4–9, 1997.

84. "Modeling the Growth of Bulk Single Crystals via High Performance Computing," 12th Technical Annual Meeting of the Korean Association of Crystal Growth and the 4th Japan–Korea Electronic Materials Growth Symposium, Seoul, Korea, June 12, 1997.

85. "Modeling the Growth of Bulk Single Crystals via High Performance Computing," Department of Chemical Engineering, KAIST — Korea Advanced Institute of Science and Technology, Taejon, Korea, June 13, 1997.

86. "Modeling the Growth of Bulk Single Crystals via High Performance Computing," Department of Chemical Engineering, National Taiwan University, Taipei, Taiwan, June 16, 1997.

87. "Massively Parallel Finite Element Analyses of Materials Processing," National Center for High-Performance Computing, Hsinchu, Taiwan, June 17, 1997.

88. "Massively Parallel Finite Element Analyses of Materials Processing," Department of Chemical Engineering, National Central University, Chung-Li, Taiwan, June 18, 1997.

89. "Modeling the Growth of Bulk Single Crystals via High Performance Computing," Taisil Electronic Materials Corp., Hsinchu, Taiwan, June 18, 1997.

90. "Materials Processing Simulations via High Performance Computing," IMA Postdoc Seminar Series, Institute for Mathematics and Its Applications, University of Minnesota, June 23, 1997.

91. "Parallel Finite Element Analysis of Three-Dimensional Fluid Flows in Materials Processing," McNU'97, the 1997 Joint ASME/ASCE/SES Summer Meeting, Northwestern University, Chicago, IL, June 29–July 2, 1997.

92. "A Three-Dimensional Finite Element Method for Microwave Heating Modeling," (with J.W. Smith and H.T. Davis), PIERS — Progress In Electromagnetics Research Symposium, Cambridge, MA, July 7–11, 1997.

93. "Modeling the growth of bulk single crystals via high performance computing," Fourth US National Congress on Computational Mechanics, San Francisco, CA, August 6–8, 1997.

94. "Parallel Finite Element Analysis of Three-Dimensional Fluid Flows in Materials Processing," Fourth US National Congress on Computational Mechanics, San Francisco, CA, August 6–8, 1997.

95. "Numerical Modeling of the Czochralski Growth of Oxide Single Crystals," CTI, Inc., Knoxville, TN, August 27, 1997.

96. "Parallel Methods for Solving Incompressible Flows Relevant to Materials Processing: Methodology and Performance," Workshop on Parallel Computing in Applied Fluid Mechanics, Pisa, Italy, September 15–18, 1997.

97. "Parallel Simulation of Fluid Flows during the Growth of Single Crystals and the Viscous Sintering of Ceramic Particles," Workshop on Parallel Computing in Applied Fluid Mechanics, Pisa, Italy, September 15–18, 1997.

98. "Modeling the growth of large, single crystals of electronic and photonic materials via high performance computing," Departmental Seminar Series, Department of Chemical Engineering, University of California at Santa Barbara, Santa Barbara, CA, October 2, 1997.

99. "Numerical Simulation in Crystal Growth," (presented by J.C. Rojo), Department of Applied Physics, Universidad de Valencia, Valencia, Spain, October 3, 1997.

100. "Modeling the growth of large, single crystals of CdTe and CdZnTe," Advanced Electronics Manufacturing Technologies Department, Sandia National Laboratories, Livermore, CA, November 3, 1997.

101. "Polymer Processing at the University of Minnesota: Experimental and Computational Studies," (with C.W. Macosko), Polymers Research Branch, Materials Division, US Army Research Laboratory, Aberdeen Proving Ground, MD, January 29,1998.

102. "Parallel Finite Element Computations of Three-Dimensional, Incompressible Flows in Materials Processing," Fourth Japan-US Symposium on Finite Element Methods in Large-Scale Computational Fluid Dynamics, Tokyo, Japan, April 2–4, 1998.

103. "Modeling three-dimensional continuum transport in crystal growth via high performance computing," Department of Materials Process Engineering, Kyushu University, Fukuoka, Japan, April 6, 1998.

104. "Large-scale numerical modeling of continuum phenomena in melt and solution crystal growth processes," ISSCG-10, the Tenth International Summer School on Crystal Growth, Rimini, Italy, June 1–6, 1998.

105. "Analysis of the Sintering of Amorphous Particles," CIMTEC '98, 9th International Conference on Modern Materials & Technologies, World Ceramics Conference & Forum on New Materials, Florence, Italy, June 14–19, 1998.

106. "Analysis of Macroscopic Transport Processes during the Growth of Large, Single Crystals via High Performance Computing," CIMTEC '98, 9th International Conference on Modern Materials & Technologies, World Ceramics Conference & Forum on New Materials, Florence, Italy, June 14–19, 1998.

107. "The formation of spoke patterns on melt surfaces during Czochralski oxide growth," International Workshop on Small Scale Dynamics of Physico-Chemical Processes at Interfaces, Max-Planck-Institut für Physik komplexer Systeme, Dresden, Germany, June 15–19, 1998.

108. "Finite Element Analyses of the Sintering of Newtonian and Viscoelastic Particles," (with R. Hooper and C.W. Macosko), 13th U.S. National Congress of Applied Mechanics, Gainesville, FL, June 21–25 1998.

109. "Finite Element Analyses of Viscoelastic Drop Extension," (presented by R. Hooper, with M. Toose and C.W. Macosko), 13th U.S. National Congress of Applied Mechanics, Gainesville, FL, June 21–25 1998.

110. "Atomistic Simulations of Cadmium Telluride: Toward Understanding the Benefits of Microgravity Crystal Growth," (with V. Godlevsky and J.R. Chelikowsky), NASA Microgravity Materials Science Conference, Huntsville, AL, July 14–16, 1998.

111. "An Overview of High Performance Computing and the Analysis of Continuum Transport during Materials Processing," Department of Chemical Engineering, The Technion, Haifa, Israel, July 23, 1998.

112. "Three Dimensional and Time Dependent Convection during the Growth of Bulk Crystals from the Melt and Solution: Theoretical Modeling via High Performance Computing," ICCG-12/ICVGE-10, the Twelfth International Conference on Crystal Growth and the Tenth International Conference on Vapor Growth and Epitaxy, Jerusalem, Israel, July 26–31, 1998.

113. "Parallel Finite Element Analysis of Three-Dimensional Fluid Flows in Crystal Growth," (presented by A. Yeckel), First International School on Crystal Growth Technology (ISCGT-1), Beatenberg, Switzerland, September 5–17, 1998.

114. "Three Dimensional and Time Dependent Convection during the Growth of Bulk Crystals from the Melt and Solution: Theoretical Modeling via High Performance Computing," Eastern Regional Conference on Crystal Growth & Epitaxy, ACCGE/east-98, Atlantic City, NJ, September 27–30, 1998.

115. "Finite Element Analysis of the Growth of Cadmium Zinc Telluride by the Horizontal Bridgman Method and the High-Pressure Vertical Bridgman Method," Keynote Lecture, International Conference on Computational Engineering Science (ICES '98), Atlanta, GA, October 6–9, 1998.

116. "An Overview of High Performance Computing and the Analysis of Continuum Transport during Materials Processing," Department of Chemistry, Howard University, Washington, DC, October 16, 1998.

117. "Modeling Segregation and Convection during the Growth of Ternary Alloys," NASA Marshall Space Flight Center, Huntsville, AL, January 11, 1999.

118. "Computational Modeling of the Melt Growth of Oxide Laser Crystals: Understanding and Improving Growth Technology," Science and Technology of Laser Crystals, La Jolla Advanced Topics Research School '99, La Jolla International School of Science, The Institute for Advanced Physics Studies, La Jolla, CA, July 12–15, 1999.

119. "Rotational mixing flows in solution crystal growth: From scaling analysis to process design," (presented by A. Yeckel), Science and Technology of Laser Crystals, La Jolla Advanced Topics Research School '99, La Jolla International School of Science, The Institute for Advanced Physics Studies, La Jolla, CA, July 12–15, 1999.

120. "Scientific Computation at the University of Minnesota," Colloquium of the Department of Quantitative Methods and Computer Science, St. Thomas University, St. Paul, MN, December 8, 1999.

121. "Computational Materials Research Applied to Materials Processing," Directorate of Weapons and Materials, U.S. Army Research Laboratory, Aberdeen, MD, January 13, 2000.

122. "Computational Materials Research Applied to Materials Processing," Institute of Advanced Materials Study, Kyushu University, Fukuoka, Japan, January 27, 2000.

123. "Modeling the impact of applied electro-magnetic fields on melt crystal growth: Magnetic stabilization of Bridgman micro-gravity growth," Japan Society of Promotion of Science, Kyushu University, Fukuoka, Japan, January 28, 2000.

124. "Three-Dimensional Flows and Instabilities During the Growth of Single Crystals from Liquids," International School on Hydrodynamic Instability and Turbulence, Institute of Mechanics, Moscow State University, Moscow, Russia, February 13–20, 2000.

125. "High Performance Computing and the Analysis of Materials Processing Systems," Department of Chemical Engineering, University of Pennsylvania, March 27, 2000.

126. "Continuum and atomistic simulations for understanding the melt growth of cadmium telluride and cadmium zinc telluride," Advanced Electronics Manufacturing Technologies Department, Sandia National Laboratories, Livermore, CA, April 27, 2000.

127. "Impacting Crystal Growth Understanding and Practice via High Performance Computation," Department of Mechanical Engineering, State University of New York, Stony Brook, May 5, 2000.

128. "Multi-scale modeling of solution crystal growth processes," Hausseminar, Institut für Werkstoffwissenschaften, Werkstoffe der Elektrotechnik, Friedrich-Alexander Universität Erlangen — Nürnberg, Erlangen, Germany, May 23, 2000.

129. "Modeling Three-Dimensional Continuum and Atomistic Phenomena of Bulk Crystal Growth," Department de Génie des Procédés, Ecole des Mines de Saint-Etienne, Saint-Etienne, France, July 25, 2000.

130. "Modeling Three-Dimensional Continuum and Atomistic Phenomena of Bulk Crystal Growth," Institut für Kristallzüchtung, Berlin, Germany, August 1, 2000.

131. "Suppressing convection in Bridgman crystal growth: Effects of microgravity, magnetic fields, and crucible rotation," (presented by A. Yeckel), Symposium on Computational Mechanics for Electronic Devices/Components, International Conference on Computational Engineering Sciences (ICES'2K), Los Angeles, CA, August 21–25, 2000.

132. "Representing Realistic Complexity in Numerical Models of Crystal Growth: Three-Dimensional and Time-Dependent Flows, Phase Boundaries, and Furnaces," 3rd International FORTWIHR - Conference 2001: High-performance Scientific and Engineering Computing Methods, Developments, and Applications, University of Erlangen-Nuremberg, Erlangen, Germany, March 12–14, 2001.

133. "Computer Modeling of Solution Crystal Growth Processes," Crystal Growth Laboratory, Fraunhofer Institute for Integrated Circuits, Erlangen, Germany, June 18, 2001.

134. "Multi-Scale Modeling of Solution Crystal Growth Processes," Gordon Research Conference on Thin Films and Crystal Growth Mechanisms, Williamstown, MA, July 1–6, 2001.

135. "Multi-Scale Modeling of Crystal Growth Processes," ICCG-13/ICVGE-11, the Thirteenth International Conference on Crystal Growth and the Eleventh International Conference on Vapor Growth and Epitaxy, Kyoto, Japan, July 29–August 3, 2001.

136. "Numerical simulation of crystal growth processes," 20 Jahre Kristallzüchtung am Erlanger Kristallabor, Colloquium celebrating the 60^{th} birthday of Georg Müller, Fraunhofer Institute for Integrated Circuits, Erlangen, Germany, January 25, 2002.

137. "Numerical simulation of crystal growth processes: Present and future challenges," Towards High Quality Semiconductor Materials, Seminar on Modeling and Simulation, CSC — Scientific Computing Ltd., Espoo, Finland, January 28, 2002.

138. "Computational analyses of transport and crystal growth from melt and solution," International Workshop on Computational Physics of Transport and Interface Dynamics, Max-Planck-Institut für Physik komplexer Systeme, Dresden, Germany, March 4–8, 2002.

139. "Computing Free Boundaries in Models of Melt Crystal Growth: Front-Tracking versus Enthalpy Methods," FBP2002, Free Boundary Problems: Theory and Applications, Trento, Italy, June 5–8, 2002.

140. "Multi-Scale Modeling of Crystal Growth Systems," CIMTEC 2002, 10th International Conference on Modern Materials & Technologies, World Ceramics Conference & 3rd Forum on New Materials, Florence, Italy, July 14–19, 2002.

141. "Computational modeling of crystal growth processes: What, why, and how," Short Course, Fourteenth American Conference on Crystal Growth and Epitaxy, ACCGE-14, Seattle, WA, August 3–4, 2002.

142. "Toward a comprehensive and quantitative model for microgravity crystal growth," 41st AIAA Aerospace Sciences Meeting and Exhibit, Reno, NV, January 6–9, 2003.

143. "Simulating surface reaction and bulk transport in solution crystal growth," Minisymposium on Simulation of Transport/Reaction Systems: Algorithms and Applications, SIAM Conference on Computational Science and Engineering(CSE03), San Diego, CA, February 10–13, 2003.

144. "Modeling the Dynamic Gradient Freeze growth of cadmium zinc telluride," eV Products, Inc., Saxonburg, PA, April 10, 2003.

145. "Representing realistic complexity in models of melt crystal growth: Three-dimensional and time-dependent flows, phase boundaries, and furnaces," Minisymposium on Incompressible CFD — Innovative Algorithms and Applications, Seventh U.S. National Congress on Computational Mechanics (USNCCM7), Albuquerque, NM, July 27–31, 2003.

146. "Simulating surface kinetics and bulk transport in solution crystal growth," Minisymposium on Computational Simulation of Transport/Reaction Systems: Solution Algorithms and Applications, Seventh U.S. National Congress on Computational Mechanics (USNCCM7), Albuquerque, NM, July 27–31, 2003.

147. "Analysis of the Role of Transport, Flow, and Kinetics on Vicinal Interfaces During the Growth of Crystals from Solution," Plenary presentation, 4th International Workshop on Modeling in Crystal Growth Fukuoka, Japan, November 4–7, 2003.

148. "Modeling Multi-Scale Phenomena for Process Simulation of Bulk Crystal Growth," Computational Molecular Science and Engineering Forum, Session on Multi-Scale Modeling of Chemical and Materials Processing, American Institute for Chemical Engineering Annual Meeting, San Francisco, CA, November 16–21, 2003.

149. "Using High-Performance Computing to Understand and Optimize the Growth of Large, Single Crystals," Departmental Seminar Series, Department of Chemical Engineering, University of Wisconsin, Madison, WI, November 25, 2003.

150. "A tutorial on crystal growth modeling: What, why, and how?," International School on Crystal Growth, Characterization and Applications (ISCGChA), La Pedrera, Uruguay, December 9-13, 2003.

151. "General overview of crystal growth modeling, with an emphasis on current research on CZT growth," VNIISIMS, Alexandrov, Russia, May 18, 2004.

152. "*Ab initio* modeling of diffusion in off-stoichiometric semiconductor liquids," (with E. Ko, M. Jain, and J.R. Chelikowsky) Modeling and Simulating Materials Nanoworld, 3rd International Conference on Computational Modeling and Simulation of Materials, Acireale, Sicily, Italy, May 30–June 4, 2004.

153. "Modeling of Crystal Growth Processes," ISSCG-12, The Twelfth International Summer School on Crystal Growth, Berlin, Germany, August 1–7, 2004.

154. "Computing moving boundaries in large-scale simulations of melt crystal growth." (with A. Pandy, A. Yeckel, M. Hainke, G. Mueller), Keynote lecture, Sixth World Congress on Computational Mechanics (WCCM VI), Beijing, China, September 5–10, 2004.

155. "Overview of Modeling of CdZnTe Crystal Growth," eV PRODUCTS, Inc., Saxonburg, PA, November 3, 2004.

156. "Multi-Scale Modeling of Cadmium Zinc Telluride Growth in an Industrial Crystal Growth System via CrysVUn and CATS2D with loose coupling," Numerik Group, Crystal Growth Laboratory, Fraunhofer Institute for Integrated Circuits, Erlangen, Germany, December 9, 2004.

157. "Fundamentals of Crystal Growth Process Simulation at the Macro- and Meso-Scales," ISCG-05, International School on Crystal Growth: Fundamentals, Methods and Applications to Biological and Nano-crystals, Puebla City, Mexico, March 7–11, 2005.

158. "Analysis of flow-induced and impurity-induced step-bunching instabilities during the growth of crystals from liquid solutions," (with Bing Dai, Yong-Il Kwon), The Sixteenth American Conference on Crystal Growth & Epitaxy (ACCGE-16) and The 12th US Biennial Workshop on Organometallic Vapor Phase Epitaxy (OMVPE-12), Big Sky, MT, July 10–15, 2005.

159. "Developing Quantitative, Multi-Scale Models For Microgravity Crystal Growth," (with Y.-I. Kwon, A. Pandy, P. Sonda, A. Yeckel, T. Jung, and G. Müller), Keynote lecture, Interdisciplinary Transport Phenomena In Microgravity And Space Sciences IV, Tomar, Portugal, August 7–12, 2005.

160. "Analysis of Flow-Induced and Impurity-Induced Step-Bunching Instabilities during the Growth of Crystals from Liquid Solutions," (with B. Dai), Invited presentation in the CAST Plenary Session, the AIChE 2005 Annual Meeting, Cincinnati, OH, October 30–November 4, 2005.