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Ph.D. materials scientist/mineralogist, researcher/manager specializing in computational and experimental studies of phase transitions in solid solutions. **Expert on first principles calculations of phase diagrams, and first principles based simulations of relaxor ferroelectrics.** Pioneer in the application of modern techniques of statistical mechanics to the study of phase transitions in ceramic and alloy systems. Leading expert on the theory of order-disorder, phase separation, magnetic mineralogy, multicritical phase relations in minerals, ceramics, and metals and relaxor ferroelectrics. At present I am working on large scale (320,000 atoms) first-principles based simulations of relaxor ferroelectrics such as PSN nad PMN, $Pb(Sc_{1/2}Nb_{1/2})O_3$ and $Pb(Mg_{1/3}Nb_{2/3})O_3$, respectively. Acting director of the NIST Center for Theoretical and Computational Materials Science (2004).

Education:

- **Ph.D.** in Earth and Space Sciences, State University of New York at Stony Brook, December 1982.
- **B.A.** in Geology, University of California at Santa Barbara, June 1975.

Work Experience:

- U. S. Department of Commerce, National Institute of Standards and Technology, formerly National Bureau of Standards, Materials Scientist, 6/87 to present.

- American Society for Metals, Research Associate, Database Coordinator, and Associate Editor for the Bulletin of Alloy Phase Diagrams. At the National Bureau of Standards, 2/1/85 to 6/87.
- National Research Council Associate, National Bureau of Standards, 2/1/83 to 1/31/85.

Teaching Experience:

- Visiting Professor, Institute for Materials Research, Sendai, Japan, 2005.
- Visiting Scientist, Pulvermetallurgisches Laboratory, Max Planck Institute, Stuttgart, Germany, 2000.
- Short course on the cluster variation method, University Autonoma, Barcelona, Spain, 1995.
- Teaching assistant for Crystallography, a first year graduate course.
- Organization and teaching of the laboratory section, teaching the theory and application of precession camera photography and computer programming in BASIC.
- Teaching assistant for Petrology, an upper division undergraduate course. Substitute lecturer for Professor A. E. Bence.

Society Memberships: American Physical Society, American Geophysical Union.
Committee Work: Councillor, Geological Society of Washington, D.C. 1987-1989; A.G.U Mineral acquisitions and distribution subcommittee, 1985-1987.
Personal Information: Born March 20, 1949; Divorced with two daughters, 20 and 21 years old. Interests: chess, Argentine-tango, canoing, theater, film, fly fishing.

Publications:
(peer reviewed articles)

- B.P. Burton, E. Cockayne, S. Tinte, and U.V. Waghmare, The effect of nearest neighbor [Pb-O] divacancy pairs on the ferroelectric-relaxor transition in Pb(Sc1/2,Nb1/2)O3. submitted to PRB (11/13/2007).

- B. P. Burton, P. Robinson, S. A. McEnroe, K. Fabian and T. BoffaBallaran A low-temperature phase diagram for ilmenite-rich compositions in the system $Fe_2Oi_3 - FeTiOi_3$ (accepted, American Mineralogist).

- B.P. Burton, S. Tinte, E. Cockayne and U.V. Waghmare, The Effect of Nearest Neighbor [Pb-O] Divacancy Pairs on the Ferroelectric-RelaxorTransition in Nano-Ordered $Pb(Sc_{1/2}Nb_{1/2})O_3$, Integrated Ferroelectrics, IEEE, in press).

- B. P. Burton and T. Nishimatsu, First Principles Phase Diagram Calculations for the System $NaNbO_3$-$KNbO_3$: can spinodal decomposition generate relaxor ferroelectricity? Appl. Phys. Lett. 91,[9] 092907 (2007)

- V.L. Vinograd, Burton, B.P., Gale, J.D., Allan, N.L., Winkler, B. Activity-composition Relations in the System Calcite-Magnesite Predicted from Static Structure Energy Calculations and Monte Carlo Simulations, Geochimica et Cosmochimica Acta (In Press).

- L. Bellaiche, Jorge Iniguez, Eric Cockayne, and B. P. Burton, "Effects of vacancies on the properties of disordered ferroelectrics: a first-principles study", Phys. Rev. B 75, 014111 (2007).

- Silvia Tinte, B. P. Burton, Eric Cockayne and U. V. Waghmare, Origin of the relaxor state in $Pb(B_xB'_{1-x})O_3$ perovskites, Phys. Rev. Lett. 97, 137601 (2006).

- B.P. Burton, E. Cockayne, S. Tinte, and U.V. Waghmare, "First-Principles Based Simulations of Relaxor Ferroelectrics", Phase Transitions 79, 91 (2006).

- B.P. Burton and A. van de Walle, First Principles Phase Diagram Calculations for the Wurtzite-Structure Systems AlN-GaN, GaN-InN and AlN-InN. in press, J. Appl. Phys. 9/2006.

- Patrice E. A. Turchi, Igor A. Abrikosov, Benjamin Burton, Göran Grimvall, Larry Kaufman, Pavel Korzhavyi, V. Rao Manga, Munekazu Ohno, Alexander Pisch, Andrew Scott and Wenqing Zhang, Interface between Quantum Mechanical-based Approaches, Experiments, and CALPHAD Methodology, CALPHAD, in press

- B.P. Burton and A. van de Walle First Principles Phase Diagram Calculations for the System NaCl-KCl: the role of excess vibrational entropy. In review for a special issue of "Chemical Geology" on solid solutions 1/2005.

- Eric Cockayne, and Benjamin P. Burton, "Dipole moment of a Pb-O vacancy pair in PbTiO3", Phys. Rev. B 69, 144116 (2004)

- B. P. Burton, E. Cockayne and U. Waghmare, Random fields in $A(B^{2+}_{1/3}B^{5+}_{2/3})O_3$ and $A(B^{3+}_{1/2}B^{5+}_{1/2})O_3$ relaxor ferroelectric: TMS Letters, 1 (2) (2004), pp. 29-30.

- B. P. Burton, A. Chakka, and D. Singh, Chemical, Magnetic and Charge Ordering in the system $Fe_2O_3 - FeTiO_3$, Phase Transitions 8, 239-249 (2005).

- S. A. Prosandeev, E. Cockayne, B. P. Burton, S. Kamba, J. Petzelt, Yu. Yuzyuk, R. S. Katiyar S. B. Vakhrushev Lattice Dynamics in $PbMg_{1/3}Nb_{2/3}O_3$: WERB approval 05/14/2004; Accepted, 7/04 to Phys. Rev. B. 5/2004

- S. A. Prosandeev, E. Cockayne, and B.P. Burton, "First-principles calculations of ionic vibrational frequencies in PbMg1/3Nb2/3O3", Fundamental Physics of Ferroelectrics 2003 (AIP Conference Proceedings 637), 146 (2003), edited by P. K. Davies and D. J. Singh

- S.A. Prosandeev, E. Cockayne, and B.P. Burton, "Energetics of Li ion displacements in K1-xLixTaO3: first-principles calculations", Physical Review B 68, 014120 (2003).

- U.V. Waghmare, E. Cockayne, and B.P. Burton, "Ferroelectric Phase Transitions in Nano-scale Chemically Ordered PbSc0.5Nb0.5O3 using a First-principles Model Hamiltonian", Ferroelectrics 291, 187 (2003).

- B.P. Burton and A. Van de Walle, "First Principles Based Calculations of the CaCO3-MgCO3 Subsolidus Phase Diagrams", Physics and Chemistry of Minerals 30, 88 (2003).

- Serguei Prosandeev, Eric Cockayne and Benjamin Burton, Studies of $KNbO_3$, $KTaO_3$ and $LiTaO_3$ Solid Solutions, and Li Off-Centering in $K_{1-x}Li_xTaO_3$; First Principles Calculations, Accepted, Phys. Rev. B 3/2003

- B. P. Burton and E. Cockayne, "Unexpected ground state structures in relaxor ferroelectrics", Ferroelectrics, **270**, 173- (2002).

- First Principles Based Calculations of the $CaCO_3-MgCO_3$ and $CaCO_3-MgCO_3$ Subsolidus Phase Diagrams, B.P. Burton and A. Van de Walle, Physics and Chemistry of Minerals, **30**,[2] 88- (2003)

- B.P. Burton and E. Cockayne, Prediction of the $[Na_{1/2}, Bi_{1/2}]TiO_3$ Ground State. in Fundamental Physics of Ferroelectrics, H. Krakauer Ed. AIP Proceedings 582, pp 82- (2001).

- B.P. Burton, N. Dupin, S.G. Fries, G. Grimvall, A. Fernández Guillermet, P. Miodownik, W.A. Oates, and V. Vinograd, Ab Initio Calculations in the CALPHAD Environment. WERB 2/8/01. Z. Metallkd. 92(6) (2001) 514-525.

- E. Cockayne, B. P. Burton, and L. Bellaiche, "Temperature-dependent properties of PSN from first principles", in Fundamental Physics of Ferroelectrics, AIP 582, pp 191-2001 (H. Krakauer, ed.).

  E. Cockayne and B.P. Burton "Comparative dielectric response in CaTi)3 and CaAl1/2Nb1/2O3 from first principles", J. Appl. Phys. 90 1459 (2001).

- B.P. Burton, Why $Pb(B, B')O3$ perovskites disorder more easily than $Ba(B, B')O3$ perovskites, and the Thermodynamics of 1:1-type Short Range Order in PMN, J. Phys. Chem. Solids 61(2) 327- (2000).

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- B.P. Burton Long-range versus short-range interactions and the configurational energies of Ba(B, B')O3 perovskites, Modelling and Simulation in Materials Science and Engineering, 8, 211- (2000).

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- R. McCormack and B.P. Burton, Modeling Phase Stability in $A(B_{1/3}B'_{2/3})O_3$ Perovskites, Computational Materials Science, 8, 153- (1997).

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- B.P. Burton and R.E. Cohen, First principles study of cation ordering in the system $Pb(Sc_{1/2}, Ta_{1/2})O_3$ and $(1-x)Pb(Sc_{1/2}, Ta_{1/2})O_3 - xPbTiO_3$, Ferroelectrics, V164, 201- (1995).

- C.J. Rawn, R.S. Roth, B.P. Burton, and M.D. Hill Phase equilibria and crystal chemistry in portions of the system $SrO - CaO - Bi_2O_3 - CuO$, PART V - the system $SrO - CaO - Bi_2O_3$. J. Am. Ceram. Soc. 77[8], 2137- (1994).

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- B.P. Burton, C.J. Rawn, R.S. Roth and N.M. Hwang Phase equilibria and crystal chemistry in portions of the system $SrO - CaO - Bi_2O_3 - CuO$, PART IV - the system $CaO - Bi_2O_3 - CuO$ J. Research, NIST, 98, 469- (1993).

- J.B.Parise, C.C. Torardi, C.J. Rawn, R.S. Roth, B.P. Burton, and A. Santoro The Synthesis and structure of Ca6Bi6O15: its relationship to Ca_4Bi_6O13. J. Solid State Chem. 102, 132- (1993).

- B.P. Burton, J.E. Osburn and A. Pasturel Theoretical Calculations of the NiAl-NiTi Phase Diagram Based LMTO and LAPW Cohesive Energy Calculations. Phys. Rev. B45, 7667- (1992).

- R.S. Roth, N.M. Hwang, C.J. Rawn, B.P. Burton, and J.J Ritter Phase equilibria in the systems $CaO - CuO$ and $CaO - Bi_2O_3$. J. Am. Ceram. Soc. 74 [9], 2148- (1991).

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- L.A. Bendersky, W. J. Boettinger, B.P. Burton, F.S. Biancaniello and Clara B. Shoemaker Investigation of ω-related phases in alloys of composition Ti_4Al_3Nb. Acta Met. 38,[6] 931- (1990).
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- R.S. Roth, C.J.Rawn, B.P. Burton and F. Beech. Phase relations and crystal chemistry in portions of the system SrO-CaO-CuO, Part-II -The system $SrO - 1/2Bi_2O_3 - CuO$. J. Research of NIST, 95, 291- (1990).
- R.S. Roth, C.J. Rawn, J.J. Ritter, and B.P. Burton Phase relations of the system SrO-CaO-CuO. J. Am. Ceram. Soc. 72(8) 1545- (1989).
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- B.P. Burton, and P. M. Davidson Short-range order and frustration in omphacite. Phy. Chem. Minerals, 15:570- (1988).
- Kikuchi, R. and Burton Calculation of some oxide systems using the cluster variation method. Physica B 150 132- (1988).
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- Burton, B.P. Theoretical analysis of cation ordering in binary rhombohedral carbonate systems. Am. Min., 72, 329- (1987).
- Davidson, P.M. and B.P. Burton Order-disorder in omphacitic pyroxenes: A model for coupled substitution in the point approximation. Am. Min., 72, 337- (1987).
- Burton, B.P. Theoretical analysis of chemical and magnetic ordering in the system $Fe_2O_3 - FeTiO_3$. Am. Min., 70, 1027- (1985).
- Burton, B.P. and R. Kikuchi Thermodynamic analysis of the system $CaCO_3 - MgCO_3$ in the tetrahedron approximation of the cluster variation method. Am. Min. 69, 165- (1984).

- Burton, B.P. and R. Kikuchi The antiferromagnetic- paramagnetic transition $\alpha - Fe_2O_3$ in the single prism approximation of the cluster variation method. Phys. Chem. Minerals 11, 125- (1984).

- Burton, B.P. Thermodynamic analysis of the system $Fe_2O_3 - FeTiO_3$. Phys. Chemof Minerals 11, 132- (1984).

Conference Proceedings Papers:

- Serguei Prosandeev, Eric Cockayne and Benjamin Burton, First Principles Studies of $KNbO_3$, $KTaO_3$ and $LiTaO_3$ Solid Solutions, Accepted for publication AIP conference proceedings; Workshop on Ferroelectrics Wash. D.C. Feb. 2002.

- Eric Cockayne, Benjamin P. Burton, Effect of Ordered Microdomains on the Properties of $PbSc_{1/2}Nb_{1/2}O_3$: A First Principles Effective Hamiltonian Study, Accepted, AIP conference proceedings; Workshop on Ferroelectrics Wash. D.C. Feb. 2002.

- R. McCormack and B. Burton, Modeling Phase Stability in $A(B_{1/3}B'_{2/3})O_3$ Perovskites, MRS Proceedings, In press (1997).

- B.P. Burton, T.G. Clark, K.L. Lukas, A.D. Pelton, H. Seifert, and P. Spencer, Thermodynamic Models and Data for Pure Elements and Other Endmembers of Solutions, Group 5: Estimations of Enthalpies and Entropies of Transition, CALPHAD, 19 [4] 537- (1995).

- B.P. Burton, and A. Pasturel LMTO/CVM calculations of metastable BCC-based phase relations in the system Fe-Be. In "Statics and Dynamics of Alloy Phase Transformations," P.E.A. turchi and A. Gonis, Ed. NATO ASI Series, V319, Plenum Press (1994).

- B.P. Burton, A. Pasturel, and W.C. Carter LMTO/CVM calculations of partial BCC based phase relations in the system Ni-Al-Ti. Proceedings of the international workshop on Ordering and Disordering in alloys, Grenoble (1991).

- Burton, B.P. The interplay of chemical and magnetic ordering in oxide minerals. Reviews in Mineralogy V25, 303-321, D.H. Lindsley Ed. MSA, Wash. DC (1991).

- B.P. Burton, J.E. Osburn and A. Pasturel LMTO/CVM and LAPW/CVM calculations of the NiAl-NiTi pseudobinary phase diagram. MRS Symposium on High- Temperature Ordered Intermetallic Alloys, IV, V213 107-112, L.A. Johnson, D.P. Pope, J.O. Stiegler Eds. (1991).

- Roth, R. S., C. J. Rawn and B.P. Burton, Phase equilibria and crystal chemistry in portions of the system $SrO-CaO-Bi_2O_3-CuO$. Part III-preliminary phase diagrams for the ternary systems $SrO-Bi_2O_3-CuO$, $CaO-Bi_2O_3-CuO$ and $SrO-CaO-Bi_2O_3$. Ceram. Trans. V13 "Superconductivity and Ceramic Superconductors" 23-34. Am. Ceram. Soc., Westerville OH (1990).

- Burton, B.P. Application of the ϵ-G approach to binary rhombohedral carbonate systems. International Geological Conference, W. D. C. Summer 1989.

- Burton, B.P. Modeling order-disorder transitions with CVM calculations. In press, Computer Modeling of Phase Diagrams, L. H. Bennett Editor, The Met.l Society of AIME (1986).

- Burton, B.P. Tricritical phase relations in minerals. In Computer Modeling of Phase Diagrams,L. H. Bennett editor, The Metl. Soc. of AIME 129- (1986).

Books:

- B.P. Burton, "Order-Disorder and Phase Separation," in Encyclopedia of Materials Science: Science and Technology, IBSN: 0-08-0431526, pp. 6493-6502, Elsevier Science Ltd. (2001).

- B.P. Burton in "Phase Diagrams of Binary Iron Alloys, H. Okamoto, ed., American Society for Metals, (1993), Chapters on Al-Fe, Fe-K, Fe-Na, Fe-Pb, Fe-Rb, and Fe-Zn.

- Massalski, T. B. J. L. Murray, and L. H Bennett, (B.P. Burton, assistant editor; 1987) Binary Alloy Phase Diagrams, ASM.

Invited Lectures and Presentations:

- B. P. Burton, "First principles based simulations of relaxor ferroelectrics" Carnegie Institute of Washington, 10/2007.

- B. P. Burton, First principles based simulations of relaxor ferroelectrics.Department of Materials Science and Engineering, KTH, Stockholm, Sweden 03/2007 (Symposium for members of the department and David Andersson's Opponent and thesis committee)

- B. P. Burton, The Effects of near neighbor [Pb-O] vacancy pairs on the dielectric properties of $Pb(Sc_{1/2}Nb_{1/2})O3$ International Alloy Conference (Sigtuna Sweden June 17-19, 2007.

- B. P. Burton, "First-Principles based simulations of relaxor ferroelectrics" Norwegian Geological Survey, Trondheim Norway 7/2006.
- B. P. Burton, "First-Principles based simulations of relaxor ferroelectrics" Norwegian Technical University, Trondheim Norway 7/2006.
- B. P. Burton, "Relaxor Ferroelectrics" BGI, Bayreuth,Germany, 2/2006.
- B. P. Burton, "Structure, Reactivity and Properties of Oxide Materials," BGI, Bayreuth,Germany, 2/2006.
- B.P. Burton, E. Cockayne, S. Tinte, and U. V. Waghmare, First Principles Based Simulations of Relaxor Ferroelectrics, US/Japan seminar on dielectric and piezoelectric materials, Annapolis, MD. (10/15/2005)
- B. P. Burton "Workshop on Thermodynamic Modeling and First-Principles Calculations" 6 - 12 March, 2005, Ringberg Castle, Tegernsee, Germany Meeting Place of the Max Planck Society
- B. P. Burton "First principles based simulations of relaxor ferroelectrics" Institute for Materials Research, Tohoku U. Sendai, Japan. May 18, 2005.
- B. P. Burton "First principles based simulations of relaxor ferroelectrics" Tokyo Institute of Technology, Tokyo, Japan. July 14, 2005.
- B. P. Burton "First principles based simulations of relaxor ferroelectrics" Japanese Atomic Energy Research Institute, Tokai, Japan. July 25, 2005.
- B. P. Burton "First principles based simulations of relaxor ferroelectrics" Jtokyo University, Kashiwa campus, Japan. July 26, 2005.
- B. P. Burton, E. Cockayne, U.V. Waghmare Simulation of PNR-PNR correlations in Relaxor Ferroelectrics Geophysical Lab Carnegie Inst. Washington D.C. 09/09/04

  B.P. Burton and A. van de Walle "Vibrational Entropy-Induced Ordering Predicted in AlN-GaN" Fall MRS Meeting, Boston MA, 11/29-12/3/2004.

  E. Cockayne, S. Tinte, S. Prosendeev and B. Burton "Generation of lattice Wannier functions for solid solutions" 2005 Workshop on Fundamental Physics of Ferroelectrics February 6-9, 2005 Williamsburg, Virginia.
- B. P. Burton "First principles based simulations of relaxor ferroelectrics" EPFL Workshop on piezoelectrics. Also "Vibrational entropy effects in first principles phase diagram calculations for oxides." Chalet Perce-Neige, d'Oex, Switzerland 2/2004.

- Fundamental physics of Ferroelectrics, Williamsburg, VA, Feb. 2003.
- S. Prosandeev, Eric Cockayne and Benjamin Burton, 2002 Workshop on First Principles Calculations for Ferroelectrics Feb. 3-6, 2002, Washington D.C.
- Eric Cockayne and Benjamin Burton, 2002 Workshop on First Principles Calculations for Ferroelectrics Feb. 3-6, 2002, Washington D.C.
- Carneigie Inst. of Washington June, 2002.
- Cation Ordering in Relaxor Ferroelectrics, B.P. Burton ACERS PAC RIM 4, Maui, Hawaii, Nov. 4-8, 2001.
- Fundamental physics of Ferroelectrics, Williamsburg, VA, Feb. 2001.
- Pulvermetallurgisch Labrotorium, Max Planck Inst. Stuttgart 11/2001.
- Institut fu"r Mineralogie, University of Muenster 10/2001.
- American Ceramic Society, 4/30-5/3/2000, St. Louis MO.
- Materials Research Lab Seminar, U. Penn. 3/16/2000.
- Fundamental physics of Ferroelectrics, Aspen CO, Feb. 13-20, 2000.
- Complex Systems Theory Branch, Naval Restarch Lab. Wash. DC, Oct. 19, 1999.
- Thermodynamics and Structural Properties of Alloy Materials, June 20-24 (1999), Aruba.
- B.P. Burton and E. Cockayne, American Ceramic Society, PCRM, October 21-24, 1999 Irvine, CA.
- B.P. Burton, Mineralogy at the Millenium April 12, 1999. Carnegie Institute of Washington DC.
- B.P. Burton, US Navy Workshop on transduction materials and devices, April 13-15, 1999. Penn State University
- B. Burton, Sixth Williamsburg Workshop on First-Principles Calculations for Ferroelectrics, February 1-4, 1998.
- Mineralogy at the Millenium April 12, 1999. Carneige Institute of Washington DC.
- American Ceramic Society, PCRM, October 21-24 (1998), Irvine, CA.

- B. Burton, Third Ringberg Workshop on "Applications of Computational Thermodynamics." Tegernsea, Germany, Nov. 30 - Dec 5, 1997.
- Williamsburg workshop on first principles calculations for ferroelectrics, Williamsburg VA, February 1997
- 51'st International Calorimetry Conference, Vancouver Canada, August, 1996
- CECAM workshop on Theoretical predictions of alloy stability, Lyon, France June 1996
- Materials Research Society, San Francisco CA, March 1996
- Williamsburg workshop on first principles calculations for ferroelectrics, Williamsburg VA, February 1996
- Williamsburg workshop on first principles calculations for ferroelectrics, Williamsburg VA, February 1995
- International workshop on the theory and application of the cluster variation and path probability methods, San Juan Teotihuacan, Mexico, June 1995
- Institute for Materials Science, University Autonoma, Barcelona, March, 1995
- Geosciences Depatrment, Oxford University, March, 1995
- Geosciences Depatrment, Cambridge University, February 20, 1995
- Materials Science Department, MIT, July, 1994
- Earth and Space Sciences Department, SUNY-Stony Brook, July, 1994
- Geological and Geophysical Sciences Department, and Materials Institute , Princeton University, July, 1994
- Applied Physics Department, Yale University, July, 1994
- Williamsburg workshop on first principles calculations for ferroelectrics, Williamsburg VA, February 1994
- Allied Signal Engineered Materials Research Center Des Plaines Il. October, 1992
- B.P. Burton, and A. Pasturel LMTO/CVM calculations of metastable BCC-based phase relations in the system Fe-Be. NATO Advanced Study Institute, Rhodos, Greece, 6/21- 7/3/92.
- Mineralogical Society of America Short Course on Oxide Minerals May-June, 1991

- European Geological Union, March, 1991
- The Met.l Society (TMS), October, 1989
- 44'th Annual Calorimetry Conference, August, 1989
- International Geological Congress, July, 1989
- Mineral Physics Section, AGU, Spring 1989
- E.I. duPont deNemours Experimental Station Wilmington DE. June, 1989
- Geophysical Laboratory of Washington DC, March, 1989
- International Conference on Phase Stability and Electronic Structure in Advanced Ceramics, August, 1987
- Geology Department Penn. State University, Fall, 1986
- Argonne National Labs, Mater. Science Department, Winter, 1986
- Metallurgy Department, Royal Institute of Technology Stockholm Sweden, Fall, 1986
- Earth Sciences Department Lawrence Livermore Labs. Spring, 1986
- Metallurgical Society, Toronto, Fall, 1985
- AGU, Baltimore, Microscopic-Macroscopic Session, Spring, 1985
- Geology Department, California Institute of Technology, Winter, 1984
- Institute Josef Stefan, Ljubljana Yugoslavia, Summer, 1984
- Geology Department University of Maryland, Winter, 1983
- Geology Department Princeton University, Winter, 1983
- U.S.G.S Reston VA. Fall, 1983
- Geophysical Laboratory of Washington DC, Fall, 1983
- Catholic Univ. Statistical Physics Seminar, Spring, 1982