

# CURRICULUM VITAE

## Russell J. Hemley

***Date and Place of Birth:*** October 26, 1954; Berkeley, California

***Address:*** College of Liberal Arts and Sciences  
University of Illinois Chicago  
845 West Taylor Street, M/C 273, 211  
Chicago, IL 60607-7059  
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***Education:*** Ph.D., Harvard University, Chemistry, 1983  
M.A., Harvard University, Chemistry, 1980  
B.A., Wesleyan University, Chemistry, 1977

***Professional Experience:***

2019- Liberal Arts and Sciences Distinguished Chair in the Natural Sciences, Professor of Physics and Chemistry, with appointment in Department of Earth and Environmental Sciences, University of Illinois Chicago

2016-2019 Research Professor, Institute of Materials Science and Department of Civil and Environmental Engineering, The George Washington University

2017 Mary Upson Visiting Professor, Department of Applied and Engineering Physics, Cornell University

2016-2018 Visiting Scientist, Geophysical Laboratory, Carnegie Institution

2016-2017 Physicist, Lawrence Livermore National Laboratory

2015-2017 Visiting Senior Scientist, Department of Chemistry, Georgetown University

2014-2018 Director, Energy Frontier Research in Extreme Environments (EFree), a DOE Energy Frontier Research Center

2014-2019 Chair, JASON Advisory Group

2009-2019 Co-Executive Director, Deep Carbon Observatory

2009-2014 Associate Director, Energy Frontier Research in Extreme Environments (EFree), a DOE Energy Frontier Research Center

2007-2013 Director, Geophysical Laboratory, Carnegie Institution

2003- Director, Carnegie/DOE Alliance Center (CDAC), a DOE/NNSA Center of Excellence; now Chicago/DOE Alliance Center

2003- Member, JASON Advisory Group

1987-2016 Senior Staff Scientist, Geophysical Laboratory

1996-1999 Visiting Professor, Ecole Normale Supérieure, Lyon, France

1991 Visiting Professor, Johns Hopkins University

1984-1987 Carnegie Fellow, Geophysical Laboratory, Carnegie Institution

1983-1984 Postdoctoral Fellow, Harvard University

1979-1983 Teaching Fellow/Research Assistant, Harvard University  
1977-1978 Teaching Fellow/Research Assistant, Wesleyan University

***Selected Honors and Awards:***

Sack Lecturer, Cornell University, 2017  
Mineral hemleyite named by Italian scientists and approved by the International Mineralogical Association, 2016  
Marker Lecturer, Pennsylvania State University, 2016  
Pimentel Lecturer, University of California – Berkeley, 2014  
Bridgman Award, International Association for the Advancement of High Pressure Science and Technology, 2009  
Honoris Causa Professor for Energetics, Mechanics, Machinery, and Control Systems, Russian Academy of Sciences, 2008  
Corresponding Fellow, Royal Society of Edinburgh, 2008  
Balzan Prize in Mineral Physics, 2005  
Hillebrand Medal, American Chemical Society, 2003  
Member, National Academy of Sciences, 2001  
Fellow, American Academy of Arts and Sciences, 1997  
Fellow, American Geophysical Union, 1997  
Fellow, American Physical Society, 1996  
Alan Berman Research Pub. Award, Dept. of the Navy, 1996  
Fellow, Mineralogical Society of America, 1990  
Mineralogical Society of America Award, 1990  
Phi Beta Kappa, 1977  
Sigma Xi, 1977

***Research Interests:***

High-pressure behavior of materials, particularly Earth and planetary materials; transformations of hydrogen at multimegabar pressures; novel high-pressure compound formation and pressure-induced chemical reactions in molecular systems; synthesis and characterization of new superhard materials, superconductors, and magnetic materials; pressure-induced amorphization; the effects of pressure on amorphous solids; the rational design of new high-pressure materials from first-principles methods; models for Earth and planetary interiors; fabrication of single crystal diamond by chemical vapor deposition; development of high-pressure methods and analytical techniques such as micro-optical spectroscopy, synchrotron infrared spectroscopy, synchrotron x-ray diffraction and spectroscopy, laser heating, magnetic susceptibility, electrical conductivity, and high-pressure cryogenic methods; science issues related to national security.

***Professional Service:***

NRC Workshop on Physics and Chemistry of Earth Materials, Airlie, Virginia, 1986  
Contributor, *Earth Materials Research*, edited by C. T. Prewitt et al., National Academy Press, Washington, D.C., 1987  
Participant, Mineral Physics Workshop, American Geophysical Union Mineral Physics Committee Workshop, Lake Arrowhead, California, September 1988

Convenor, High-Pressure Mineral Physics, 1988 Goldschmidt Conference, Hunt Valley, Maryland  
 Contributor, *Synchrotron X-ray Sources and New Opportunities in the Earth Sciences: Workshop Report*, J. Smith and M. Manghnani, co-chairs, Argonne National Lab., Argonne, IL, 1988  
 Contributor, *Frontiers in Mineral Physics*, Report of the AGU Mineral Physics Committee, AGU, Washington, D.C. 1989, edited by T. J. Ahrens et al.  
 Program Committee, 12th AIRAPT Meeting, Paderborn, West Germany, July 1989  
 Member, GeoSynch Committee, American Geophysical Union, 1989-  
 Committee on Committees, Mineralogical Society of America, 1990  
 Committee for Study of the Earth's Interior (SEI), American Geophysical Union, 1990-  
 Associate Editor, *Journal of Geophysical Research*, 1991-1993  
 Contributor, *Science at the Frontier*, edited by A. Greenwood et al., National Academy Press, Washington, D.C. 1992  
 Co-Convenor, Symposium on Computational Physics in Mineralogy, 29th International Geological Congress, Kyoto, 1992  
 Session Organizer, Symposium on Cooperative Studies of the Earth's Deep Interior (CSEDI), Santa Fe, New Mexico, October 1993  
 Co-convenor, Thermoelasticity of Perovskite: Toward an Emerging Consensus, Special Session, Fall Meeting of the American Geophysical Union, San Francisco, California, 1993  
 Member, Program Committee, Joint AIRAPT/APS Meeting, Colorado Springs, Colorado, June 1993  
 Leader, Diamond-Anvil Cell Design Team, Geo/Soil/EnviroCARS (Consortium for Advanced Radiation Sources), University of Chicago and Advanced Photon Source, Argonne National Laboratory, 1993-  
 Co-convenor, Symposium on the Earth's Lower Mantle and Core, International Mineralogical Association Meeting, Pisa, Italy, September 1994  
 Co-convenor, Materials at High Pressure, Focused Session of the Division of Materials Physics, American Physical Society, March Meeting, Pittsburgh, Pennsylvania, 1994  
 Visiting Committee, CHESS High-Pressure Facility, Cornell University, September 1994  
 Editorial Board, *High-Pressure Research*, November 1994-  
 Chairman, GeoSynch Committee, American Geophysical Union, December 1995-1997  
 Member, Board of Governors, Consortium for Advanced Radiation Sources, Argonne, Illinois, 1996-1997  
 Co-chairman, Mineral Physics Committee, International Mineralogical Association, 1996-1998  
 Member, Mineral and Rock Physics Committee, American Geophysical Union, 1996-1998  
 Member, Roebling Medal Committee, Mineralogical Society of America, 1996-  
 Member, Steering Committee, Center for High-Pressure Research, 1996-  
 Spokesperson of U2A PRT of the NSLS, 1996-  
 Co-convenor, Symposium on Materials at High Pressure, Materials Research Society, Boston, November 1997  
 Member, Geophysical Laboratory Director Search Committee, 1997  
 Member, Bridgman Award Committee, AIRAPT, 1997-  
 Co-covenor, Mineralogical Society of America Short Course, "Ultra-high-Pressure Mineralogy", Davis, California, December 1998  
 Chairman, Mineral Physics Committee, International Mineralogical Association, 1998-  
 Member, High Pressure International Commission, Union of Crystallography, 1998-  
 Co-convenor, CIW-MSA-NSF Workshop "Mineralogy at the Millennium", April 1999

Member, Program Committee, 17<sup>th</sup> AIRAPT Conference, 1999  
 Co-convenor, CECAM Workshop: Frontiers in High-Pressure Materials Physics, July 1999  
 Participant, NSF/NRC Workshop on Mineral and Rock Physics, May 1999  
 Member, High-Pressure Commission, International Union of Crystallography, 1999-  
 Member, Steering Committee, HPCAT, Advanced Photon Source, 1999-  
 Visiting Committee, Institute for the Study of the Earth's Deep Interior, Misasa, Japan, January  
 2000  
 Co-convenor, High-Pressure Neutron Scattering Workshop, Argonne National Lab, April 2000  
 Co-convenor, Laser-Heating Workshop, Advanced Photon Source, May 2000  
 Co-convenor, W. A. Bassett Symposium, AGU Spring Meeting, May 2000  
 Member, Program Committee, Warm Dense Matter Workshop, Vancouver, Canada, May 2000  
 Member, Program Committee, International Cryocrystals and Quantum Crystals Conference,  
 Szklarska Poreba, Poland, July 2000  
 Co-convenor, IGC Mineral Physics and Chemistry Symposium, Rio de Janeiro, Brazil, Aug. 2000  
 Member, Program Committee, IUCr High-Pressure Workshop, SPRing8, Japan, Oct. 2000  
 Co-convenor, In Situ Techniques Symposium, Goldschmidt Conf., Roanoke, VA, May 2000  
 Advisory Editor, High-Pressure Research, 2000-  
 Director, Enrico Fermi School of Physics "High-Pressure Phenomena", Varenna, Italy, July 2001  
 Member, Program Committee, IUCr Workshop on Neutron and X-ray Diffraction, Saclay, France,  
 October 2001  
 Member, Executive Committee, NSF COMPRES Consortium, 2002-2004  
 Co-PI, High-Pressure Beamline of the Spallation Neutron Source, Oak Ridge National Laboratory,  
 2002-  
 Member, Visiting Committee, Dept. of Earth and Planetary Sciences, Harvard University, 2003  
 Director, Carnegie/DOE Alliance Center (CDAC), 2003-  
 Member, Mineralogical Society of America Award Committee, 2004 -  
 Member, Program Committee, International Cryocrystals and Quantum Crystal Conference,  
 Wroclaw, Poland, September 2004  
 Co-convenor, Roebling Symposium, Geological Society of America, 2005  
 Member, Visiting Committee, Dept. of Earth and Planetary Sciences, Harvard University, 2006  
 Member, Program Committee, IMA, Kobe, 2006  
 Member, Program Committee, ADC Conference, 2006  
 Co-convenor, Workshop on Synergy of 21<sup>st</sup> Century High-Pressure Science and Technology,  
 Advanced Photon Source, Argonne, IL, 2006  
 Member, Selection Committee for the American Physical Society Shock Compression Science  
 Award, 2006  
 Member, Visiting Committee, Department of Earth & Planetary Sciences, Harvard University,  
 2006  
 Member, Program Committee, Synergy of 21<sup>st</sup> Century High-Pressure Science & Technology  
 Workshop, APS, 2006  
 Member, Project Advisory Committee, NSLS-II, 2006-2009  
 Co-convenor, High-Pressure Materials Science Symposium, MRS, Boston, 2007  
 Member, Program Committee, International Cryocrystals and Quantum Crystals Conference,  
 Wroclaw, Poland, 2007 -  
 Co-chair, DOE-BES Basic Research Needs Workshop: Materials in Extreme Environments, 2007  
 Chair, Board of Governors, HPSynC, Argonne National Lab, 2007-

Member, Board on Earth Science and Resources, National Research Council, 2007–  
Member, Advisory Board of Fizika Nizkikh Temperatur, 2008  
Member, Review Committee, National Academy of Sciences, NCNR, NIST, 2008-2011  
Member, Physical Sciences Directorate Review Committee, LLNL, 2008  
Member, MaRIE External Advisory Committee, LANL, 2008-2014  
Member, Advisory Committee, CC-2010 Conference on Cryocrystals and Quantum Crystals, 2009  
Panel Lead, Future of Compression Science Workshop, LANL, 2009  
Member, COMPRES Laser Heating Workshop Program Committee 2009  
Member, Stanley Miller Medal Selection Committee, NAS, 2009  
Member, LANS/LLNS Mission Committee, 2009-2015  
Review Coordinator, NAS Comprehensive Test Ban Treaty Study, 2010  
Vice-Chair, Energy Frontiers in Extreme Environments Center Steering Committee, DOE-BES  
EFRC, 2010-2014  
Co-chair, Deep Carbon Observatory Executive Committee, A. P. Sloan Foundation/Carnegie  
Institution, 2010-2019  
Member, CC2010 Program Committee, Chernogolovka, 2010  
Member, Shock Compression in Condensed Matter Program Committee, APS, 2010-  
Member, CHESS ERL Advisory Committee, Cornell University, 2010-2012  
Member, Light Sources Directorate Science Advisory Committee, Brookhaven National  
Laboratory, 2010-2013  
Panel Leader, National Ignition Facility User Science Workshop Committee, 2011  
Member, Technical Committee, 2013 Joint APS/AIRAPT Conference, 2012-2013  
Member, NSLS-II Beamtime Review Panel, Brookhaven National Laboratory, 2014-2017  
Member, NIF & PS Directorate Review Committee, Lawrence Livermore National  
Laboratory, 2014-  
Member, Program Committee, Novel Phases of Silicon Conference, 2015  
Member, Advisory Board, 11<sup>th</sup> International Conference on Cryocrystals, and Quantum Crystals  
(CC2016), 2015  
Member, DOE BESAC Subcommittee on Major Facilities, 2016  
Panel Lead, NSF Workshop on Midscale Instrumentation for Quantum Materials, 2017  
Member, DOE Review Committee of LCLS, 2018  
Member, Radiation Effects and High Energy Density Science External Review Board, Sandia  
National Laboratories, 2018-2021  
Panel Member, NSF Workshop on Basic Plasma Science User Facilities, 2019  
Member, Second Target Station Instrument Review Committee (STS-IRC), Spallation Neutron  
Source, Oak Ridge National Laboratory, 2021-  
Member, National Academy Review Committee on High Energy Density Science, 2021-

***Thesis Advisors:***

V. Vaida, M. Karplus

***Postgraduate Sponsors:***

M. Karplus, R. G. Gordon, H. K. Mao, and P. M. Bell

***Supervised Postdoctoral Fellows, Research Associates, and Research Scientists (92):***

M. Ahart (Aihaiti), J. V. Badding, J. Badro, A. Basu, V. S. Bhadram, J. Blank, P. Beck, A. J. Campbell, R. Chellappa, A. Chen, J. Chen, X. J. Chen, J. Ciezak, D. A. Dalton, P. Dera, O. Degtyareva, Y. Ding, T. S. Duffy, J. H. Eggert, M. I. Eremets, M. Furlanetto, Z. Geballe, A. F. Goncharov, S. A. Gramsch, E. Gregoryanz, Q. Guo, M. Hanfland, H. Hellwig, K. Hemawan, J. Z. Hu, D. Hummer, S. D. Jacobsen, A. P. Jephcoat, J. Jackson, J. Janik, P. E. Janolin, T. Jenkins, J. D. Kubicki, R. Kumar, A. Lazicki, P. Lazor, J. Li, M. Li, J. Lin, H. Liu, Z. Liu, R. Lu, Y. Ma, K. Matsuishi, I. I. Mazin, R. S. McWilliams, C. Meade, Y. Meng, Y. F. Meng, A. Mishra, J. Montoya, C. Murphy, T. Muramatsu, S. Nakano, S. Natarajan, I. Naumov, T. Okuchi, D. C. Palmer, R. J. Potter, J. Rodgers, N. Salke, C. Seagle, C. Sanloup, M. Santoro, C. Schiffrics, H. P. Scott, T. Schindelbeck, A. Sharma, G. Shen, J. Shu, M. Somayazulu, Y. Song, S. Stewart, L. Stixrude, T. Strobel, V. V. Struzhkin, N. Subramanian, R. Thugoluva, Yu. A. Timofeev, S. Tkachev, O. Tschauner, W. L. Vos, M. Weinberger, Y. Wu, J. Xu, C. S. Yan, S. Yang, Y. Yoshimura, C. S. Zha, G. Zou

***Supervised Ph.D. Students (22):***

Y. Chen, P. G. Conrad, A. Denchfield, P. Griffin, S. S. Ho, K. J. Kingma, J. D. Kubicki, J. Lai, A. Lamichhane, W. L. Mao, A. H. M. Marathamkottil, A. Mark, S. Merkel, M. Origlieri, J. R. Patterson, R. Ripani, A. Shen, S. Shieh, D. M. Teter, E. Vinitsky, T. Zapata, C. Zoller

***Supervised Undergraduate and High School Students (62):***

L. Armstrong, E. Banigan, C. Barkett, A. Benjamin, K. Brownsberger, B. Chidester, K. Chen, P. N. Chen, C. Chin, D. Cohen, J. Cohen, A. Davis, C. Farnsworth, K. Gan, R. Graham, B. Haugen, K. Hernandez, T. Hittinger, A. Levedahl, Z. Liang, A. Lindoo, E. Littlefield, S. Jacobsen, M. James, Y. Kadry, S. Khattar, S. King, M. Krawczynski, R. Kundargi, A. Kung, S. Kung, T. Liu, W. Liu, L. Loubeyre, A. Madduri, M. Madduri, T. McHale, R. Mershon, J. Mesa, M. Moses, Z. Newman, K. Phillips, D. Platner, F. Reid, O. Reyes-Becerra, J. Rivera, L. Rosario, M. Rose, V. Rozsa, C. Runge, E. Sandford, A. Savello, A. Schad, S. Scott, B. Shih, D. Shook, G. Sutton, I. Tamblyn, C. Tarabrella, R. Thomas, N. Valdez, C. Vallero, B. Wilfong, M. Wong, A. Young

***Patents (18)***

***Edited Books:***

1. *High-Pressure Materials Research. Materials Research Society Symposium, Vol. 499*, edited by R. M. Wentzcovitch, R. J. Hemley, W. J. Nellis and P. Y. Yu, Materials Research Society, Warrendale, Pennsylvania, 1998, 476 p.
2. *Ultrahigh-Pressure Mineralogy, Reviews in Mineralogy, Vol. 37*, edited by R. J. Hemley, Mineralogical Society of America, Washington, D.C., 1998, 671 p.
3. *Physics Meets Mineralogy - Condensed Matter Physics in Geosciences*, edited by H. Aoki, Y. Syono, and R. J. Hemley, Cambridge University Press, Cambridge, England, 2000, 396 p.
4. *High-Pressure Phenomena, Proceedings of the International School of Physics*, edited by R. J. Hemley, M. Bernasconi, L. Ulivi, and G. Chiarotti, IOS Press, Amsterdam, 2002.

5. *Materials Research at High Pressure, Symposium Proceedings, Vol. 987*, edited by M. R. Manaa, A. F. Goncharov, R. J. Hemley, and R. Bini, Materials Research Society, Warrendale, Pennsylvania, 2007.

**Scientific Articles:**

**1977**

1. Hemley, R. J. and B. E. Kohler, Electronic structure of the visual chromophore: A mathematical model for the observed bandshapes, *Biophys. J.*, **20**, 377-382 (1977).

**1979**

2. Hemley, R., B. E. Kohler, and P. Siviski, Absorption spectra for the complexes formed from vitamin A and  $\beta$ -lactoglobulin, *Biophys. J.*, **28**, 447-455 (1979).

**1980**

3. Roebber, J. L., D. P. Gerrity, R. J. Hemley, and V. Vaida, Electronic spectrum of furan from 2200 to 1950 A, *Chem. Phys. Lett.*, **75**, 104-106 (1980).

**1981**

4. Hemley, R. J., D. G. Leopold, J. L. Roebber, and V. Vaida, Electronic absorption spectra of jet-cooled molecules: the S<sub>2</sub> state of styrene, *J. Phys. Chem.*, **85**, 134-135 (1981).
5. Leopold, D. G., R. J. Hemley, J. L. Roebber, and V. Vaida, Direct absorption spectra of higher excited states of jet-cooled monosubstituted benzenes: phenylacetylene, styrene, benzaldehyde, and acetophenone, *J. Chem. Phys.*, **75**, 4758-4759 (1981).
6. Vaida, V., N. J. Cooper, R. J. Hemley, and D. G. Leopold, Production of gas-phase bare transition-metal clusters by laser photodissociation of organometallic cluster compounds, *J. Am. Chem. Soc.*, **103**, 7022-7023 (1981).

**1983**

7. Dinur, U., R. J. Hemley, and M. Karplus, Equilibrium geometry and dynamics of the valence excited states of 1,3-butadiene, *J. Phys. Chem.*, **87**, 924-932 (1983).
8. Hemley, R. J., J. I. Dawson, and V. Vaida, Franck-Condon analysis of the  $1^1A_g \rightarrow 1^1B_u$  transition of 1,3-butadiene from absorption and Raman intensities, *J. Chem. Phys.*, **78**, 2915-2927 (1983).
9. Hemley, R. J., D. G. Leopold, J. L. Roebber, and V. Vaida, The direct absorption spectrum of the  $1^1\Sigma_g^+ \rightarrow 1^1B_2^1(\Sigma_u^+)$  transition of jet-cooled CS<sub>2</sub>, *J. Chem. Phys.*, **79**, 5219-5227 (1983).

**1984**

10. Kohler, B. E., T. Spiglanin, R. J. Hemley, and M. Karplus, Vibrational analysis of the lowest  $1^1B_u^+$  state of trans, trans 1,3,5,7-octatetraene, *J. Chem. Phys.*, **80**, 23-30 (1984).

11. Leopold, D. G., R. D. Pendley, J. L. Roebber, R. J. Hemley, and V. Vaida, Direct absorption spectroscopy of jet-cooled polyenes. II. The  $1^1A_g \rightarrow 1^1B_u$  transitions of butadiene and hexatriene, *J. Chem. Phys.*, **81**, 4218-4229 (1984).

#### 1985

12. Hemley, R. J., U. Dinur, V. Vaida, and M. Karplus, Theoretical study of the ground and excited singlet states of styrene, *J. Am. Chem. Soc.*, **107**, 836-844 (1985).
13. Hemley, R. J. and R. G. Gordon, Theoretical study of solid NaF and NaCl at high pressures and temperatures, *J. Geophys. Res.*, **90**, 7803-7813 (1985).
14. Hemley, R. J., M. D. Jackson, and R. G. Gordon, First-principles theory for the equations of state of minerals to high pressures and temperatures: application to MgO, *Geophys. Res. Lett.*, **12**, 247-250 (1985).
15. Hemley, R. J., G. Leopold, V. Vaida, and M. Karplus, The singlet states of styrene. Theoretical vibrational analysis of the ultraviolet spectrum, *J. Chem. Phys.*, **82**, 5379-5397 (1985).
16. Mao, H. K., P. M. Bell, and R. J. Hemley, Ultrahigh pressures: optical observations and Raman measurements of hydrogen and deuterium to 1.47 Mbar, *Phys. Rev. Lett.*, **55**, 99-102 (1985).

#### 1986

17. Bell, P. M., H. K. Mao, and R. J. Hemley, Observations of solid H<sub>2</sub>, D<sub>2</sub>, N<sub>2</sub> at pressures around 1.5 megabar at 25°C, *Physica B*, **139-140**, 16-20 (1986).
18. Hemley, R. J., B. R. Brooks, and M. Karplus, Theoretical study of the ground-state vibrations of the linear polyenes, *J. Chem. Phys.*, **85**, 6550-6564 (1986).
19. Hemley, R. J., H. K. Mao, P. M. Bell, and B. O. Mysen, Raman spectroscopy of SiO<sub>2</sub> glass at high pressure, *Phys. Rev. Lett.* **57**, 747-750 (1986).
20. Hemley, R. J., H. K. Mao, and E. C. T. Chao, Raman spectrum of natural and synthetic stishovite, *Phys. Chem. Minerals*, **13**, 285-290 (1986).
21. Hemley, R. M., H. K. Mao, P. M. Bell, and S. Akimoto, Lattice vibrations of high-pressure SiO<sub>2</sub> phases: Raman spectrum of synthetic stishovite, *Physica B*, **139-140**, 455-457 (1986).
22. Mehl, M. J., R. J. Hemley, and L. L. Boyer, Potential-induced breathing model for the elastic moduli and high-pressure behavior of the cubic alkaline-earth oxides., *Phys. Rev. B*, **33**, 8685-8696 (1986).

#### 1987

23. Hazen, R. M., H. K. Mao, L. W. Finger, and R. J. Hemley, Single-crystal x-ray diffraction of n-H<sub>2</sub> at high pressure, *Phys. Rev. B*, **36**, 3944-3947 (1987).
24. Hemley, R. J., Pressure dependence of Raman spectra of SiO<sub>2</sub> polymorphs:  $\alpha$ -quartz, coesite, and stishovite, in *High-Pressure Research in Mineral Physics* (eds. M. H. Manghnani and Syono, Y.), 347-359 (Terra Scientific Publishing Company, Tokyo/American Geophysical Union, Washington, D. C., 1987).
25. Hemley, R. J., P. M. Bell, and H. K. Mao, Laser techniques in high-pressure geophysics, *Science*, **237**, 605-612 (1987).



26. Hemley, R. J., M. D. Jackson, and R. G. Gordon, Theoretical study of the structure, lattice dynamics, and equations of state of perovskite-type MgSiO<sub>3</sub> and CaSiO<sub>3</sub>, *Phys. Chem. Minerals*, **14**, 2-12 (1987).
27. Hemley, R. J., A. P. Jephcoat, H. K. Mao, C. S. Zha, L. W. Finger, and D. E. Cox, Static compression of H<sub>2</sub>O-ice to 128 GPa (1.28 Mbar), *Nature*, **330**, 737-740 (1987).
28. Hemley, R. J. and H. K. Mao, Single-crystal micro-Raman spectroscopy of phases in the Y-Ba-Cu-O superconductor, *Phys. Rev. Lett.*, **58**, 2340-2342 (1987).
29. Jephcoat, A. P., H. K. Mao, L. W. Finger, D. E. Cox, R. J. Hemley, and C. S. Zha, Pressure-induced structural phase transitions in solid xenon, *Phys. Rev. Lett.*, **59**, 2670-2673 (1987).
30. Mao, H. K., R. J. Hemley, and E. C. T. Chao, The application of micro-Raman spectroscopy to analysis and identification of minerals in thin section, *Scanning Microscopy*, **1**, 495-501 (1987).

### 1988

31. Hemley, R. J., High-pressure studies of planetary gases and liquids, *Eos Trans. Am. Geophys. Union*, **69**, 159-160 (1988).
32. Hemley, R. J., A. P. Jephcoat, H. K. Mao, L. C. Ming, and M. H. Manghnani, Pressure-induced amorphization of crystalline silica, *Nature*, **334**, 52-54 (1988).
33. Hemley, R. J., A. C. Lasaga, V. Vaida, and M. Karplus, Theoretical analysis of the  $1^1B_u^+(1^1B_1^+) \rightarrow 1^1A_g^-(1^1A_1^-)$  transition of *trans* and *cis* 1,3,5-hexatriene, *J. Phys. Chem.*, **92**, 945-954 (1988).
34. Hemley, R. J. and H. K. Mao, Phase transition in solid molecular hydrogen at ultrahigh pressures, *Phys. Rev. Lett.*, **61**, 857-860 (1988).
35. Hemley, R. J., P. F. McMillan, and G. H. Wolf, Optical spectroscopic techniques, in *Frontiers in Mineral Physics, Report of the Mineral Physics Committee of the American Geophysical Union, Chapter 13, Lake Arrowhead, CA* (eds. W. A. Bassett, Mackwell, S. J. and McMillan, P. F.), 51-99 (American Geophysical Union, 1988).
36. Hemley, R. J. and R. F. Porter, Raman spectroscopy at ultrahigh pressures, *Scripta Metallurgica*, **22**, 139-144 (1988).
37. Jephcoat, A. P., R. J. Hemley, and H. K. Mao, X-ray diffraction of Cr<sup>+3</sup>:Al<sub>2</sub>O<sub>3</sub> to 175 GPa, *Physica B*, **150**, 115-121 (1988).
38. Jephcoat, A. P., R. J. Hemley, H. K. Mao, R. E. Cohen, and M. J. Mehl, Raman spectroscopy and theoretical modelling of BeO at high pressure, *Phys. Rev. B*, **37**, 4727-4734 (1988).
39. Kubicki, J. D. and R. J. Hemley, *In-situ* high-pressure Raman spectra of silicate glasses, *Ann. Report Director Geophys. Lab. 1987-1988*, (1988).
40. Mao, H. K., R. J. Hemley, Y. Wu, A. P. Jephcoat, L. W. Finger, C. S. Zha, and W. A. Bassett, High-pressure phase diagram and equation of state of solid helium from single-crystal x-ray diffraction to 23.3 GPa, *Phys. Rev. Lett.*, **60**, 2649-2652 (1988).
41. Mao, H. K., A. P. Jephcoat, R. J. Hemley, L. W. Finger, C. S. Zha, R. M. Hazen, and D. E. Cox, Synchrotron x-ray diffraction measurements of single-crystal hydrogen to 26.5 GPa, *Science*, **239**, 1131-1134 (1988).
42. Stevenson, D. J., R. J. Hemley, and E. Knittle, Metallization of non-conductors, in *Frontiers in Mineral Physics, Report of the Mineral Physics Committee of the American Geophysical Union, Chapter 22, Lake Arrowhead, CA* (eds. W. A. Bassett, Mackwell, S. J. and McMillan, P. F.), 97-99 (American Geophysical Union, Washington, D.C., 1988).

## 1989

43. Chen, L. C., H. K. Mao, and R. J. Hemley, Compression and polymorphism of  $\text{CaSiO}_3$  at high pressures and temperatures, *Ann. Report Director Geophys. Lab.*, **1988-1989**, 94-98 (1989).
44. Finger, L. W., R. M. Hazen, and R. J. Hemley,  $\text{BaCuSi}_2\text{O}_6$ : A new cyclosilicate with four-membered tetrahedral rings, *Am. Mineral.*, **74**, 952-955 (1989).
45. Finger, L. W., J. Ko, R. M. Hazen, T. Gasparik, R. J. Hemley, C. T. Prewitt, and D. J. Weidner, Crystal chemistry of phase B and an anhydrous analogue: implications for water storage in the upper mantle, *Nature*, **341**, 140-142 (1989).
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