DAVID L. KOHLSTEDT

Education:	Ph.D., University of Illinois Solid State Physics, 1970 B.Sc., Valparaiso University Physics and Mathematics, 1965	
Professional Experience:	5/19-present	Professor Emeritus
	7/89 – 5/19	Professor Department of Earth Sciences University of Minnesota
	7/06 - 6/11	Chair, Department of Geology and Geophysics Head, Horace Newton Winchell School of Earth Sciences
	1983 - 1989	Professor
	1979 - 1983	Associate Professor
	1975 - 1979	Assistant Professor Department of Materials Science & Engineering Cornell University
	1971 - 1975	Research Associate Department of Earth & Planetary Sciences Massachusetts Institute of Technology
	1970 - 1971	Research Associate Cavendish Laboratory University of Cambridge
Visiting Positions:	2012 Spring	Visiting Scholar Earthquake Research Institute University of Tokyo
	2011 Fall	Guest Professor Faculty of Earth Sciences China University of Geosciences in Wuhan
	2004 Winter	Moore Distinguished Scholar Division of Geological and Planetary Sciences California Institute of Technology
	1999 Winter	Distinguished Lecturer Japanese Society for the Promotion of Science
	1997 Fall	Distinguished Lecturer Mineralogical Society of the United Kingdom
	1993 - 1994	Visiting Scientist Bayerisches Geoinstitut Universität Bayreuth
	1986 June	Visiting Fellow Research School of Earth Sciences Australian National University
	1984 Spring	Visiting Scientist Institut für Physikalische Chemie Universität of Hannover

	1982 - 1983	Visiting Scientist Department of Earth & Planetary Sciences MIT (8/82 - 12/82) Research School of Earth Sciences ANU (1/83 - 7/83)

Awards:	2015	Outstanding Graduate Education Award, U Minnesota
	2013-2016	Gibson Chair of Earth and Planetary Sciences
	2013	American Association for Advancement of Science Fellow
	2009	National Academy of Sciences Member
	2009	Murchison Medal, Geological Society of London
	2009	Geological Society of London Fellow
	2009	Mineralogical Society of America Fellow
	2005	Néel Medal, European Geosciences Union
	2004	Alumni Achievement Award, Valparaiso University
	2003	Hess Medal, American Geophysical Union
	2000	American Academy of Arts and Sciences Fellow
	1995	Distinguished Professor, College of Science and Engineering
	1993 - 1994	Alexander von Humboldt Senior Awardee
	1989	American Geophysical Union Fellow
	1982 - 1983	Guggenheim Fellow
	1970 - 1971	Fulbright Fellow

Current Research Themes:

With a background in condensed-matter physics and materials science combined with interests in earth and planetary sciences, my research focuses on physical and chemical properties of minerals and rocks at high pressures and temperatures, with particular emphasis on strength and viscosity. Motivation for our experiments derives from the importance of quantifying the behavior of geological materials under extreme conditions as the basis for understanding and modeling the dynamical behavior and chemical evolution of deep interiors of the terrestrial planets and their satellites. Two central themes in my current research involve fluids. First, we study physical mechanisms by which a small amount of water in the form of hydrogen dissolved in nominally anhydrous silicate minerals produces a dramatic reduction in strength. Water weakening has important consequences for convection in Earth's mantle by enabling plate tectonics, a phenomenon that is absent on Venus, a relatively dry planet often considered Earth's twin. A small amount of melt also profoundly affects the strength/viscosity of otherwise crystalline rocks. Not only is the viscosity of a partially molten rock sensitive to melt distribution, but also melt distribution is profoundly influenced by deformation. This coupling between deformation and melt distribution results in self-organization of melt into melt-enriched shear zones that not only localize deformation but also provide high permeability paths for rapid transport of melt from depth to Earth's surface. Similar behavior is anticipated on Jupiter's moon Io, the Solar System's most volcanically active body.

Other research explores the formation of long-lived, shear zones that result from mixing of mineral phases during large-strain deformation of rocks in the lithospheric mantle and stress-induced zoning, that is, kinetic demixing, that provides a chemical recorder of stress magnitude experienced by naturally deformed mantle rocks.

Publications (refereed):

1. Daybell, M.D., Kohlstedt, D.L., Steyert, W.A. (1967) Thermopower and resistivity of Au-V near the Kondo temperature, *Solid State Commun.* 5:871-874, https://doi.org/10.1016/0038-1098(67)90318-3.

2. Kohlstedt, D.L., Williams, W.S., Woodhouse, J.B. (1970) Chemical diffusion in titanium carbide, *J. Appl. Phys.* 41:4476-4484, https://doi.org/10.2172/4751961.

3. Kohlstedt, D.L., Williams, W.S. (1971) Investigation of charge separation in titanium carbide using electromigration, *Phys. Rev.* B3:293-305, https://doi.org/10.1103/physrevb.3.293.

4. Hannink, R.H.J., Kohlstedt, D.L., Murray, M.J. (1971) Brittle-region slip systems in the transition-metal carbides, P*hys. Stat. Sol. A* 6:K25-K28, https://doi.org/10.1002/pssa.2210060146.

5. Hannink, R.H.J., Kohlstedt, D.L., Murray, M.J. (1972) Slip system determination in cubic carbides by hardness anisotropy, *Proc. R. Soc. Lond.* A326:409-420, https://doi.org/10.1098/rspa.1972.0017.

6. Kohlstedt, D.L. (1973) The temperature dependence of microhardness of the transition-metal carbides, *J. Mat. Sci.* 8:777-786, https://doi.org/10.1007/bf02397907.

7. Goetze, C., Kohlstedt, D.L. (1973) Laboratory study of dislocation climb and diffusion in olivine, *J. Geophys. Res.* 78:5961-5971, https://doi.org/10.1029/jb078i026p05961.

8. Kohlstedt, D.L., Vander Sande, J.B. (1973) Transmission electron microscopy investigation of the defect microstructure of four natural orthopyroxenes, *Contrib. Mineral. Petrol.* 42:169-180, https://doi.org/10.1007/bf00371506.

9. Kohlstedt, D.L., Goetze, C. (1974) Low-stress high-temperature creep in olivine single crystals, *J. Geophys. Res.* 79:2045-2051, https://doi.org/10.1029/jb079i014p02045.

10. Vander Sande, J.B., Kohlstedt, D.L. (1974) A high-resolution electron microscope study of exsolution lamellae in enstatite, *Phil. Mag.* 29:1041-1049, https://doi.org/10.1080/14786437408226589.

11. Kohlstedt D.L., Vander Sande, J.B. (1975) An electron microscopy study of naturally occurring oxidation produced precipitates in iron-bearing olivines, *Contrib. Mineral. Petrol.* 53:13-24, https://doi.org/10.1007/bf00402451.

12. Kohlstedt, D.L., Goetze, C., Durham, W.B., Vander Sande, J.B. (1976) New technique for decorating dislocations in olivine, *Science* 191:1045-1046, https://doi.org/10.1126/science.191.4231.1045.

13. Kohlstedt D.L., Vander Sande, J.B. (1975) On the detailed structure of ledges in an augite-enstatite interface, in *Electron Microscopy in Mineralogy*, ed. H.-R. Wenk, Springer-Verlag, Heidelberg, 234-237, https://doi.org/10.1007/978-3-642-66196-9_15.

14. Kohlstedt, D.L., Goetze, C., Durham, W.B. (1976) Experimental deformation of olivine single crystals with application to flow in the mantle, in *Petrophysics: The Physics and Chemistry of Minerals and Rocks*, ed. R.G.J. Strens, John Wiley & Sons Ltd., London, 35-49.

15. Vander Sande, J.B., Kohlstedt, D.L. (1976) Observation of dissociated dislocations in deformed olivine, *Phil. Mag.* 3:653-658, https://doi.org/10.1080/14786437608223803.

16. Goetze, C., Kohlstedt, D.L. (1977) The dislocation structure of experimentally deformed marble, *Contrib. Mineral. Petrol.* 5:293-306, https://doi.org/10.1007/bf00374558.

17. Lerner, I., Chiang, S.-W., Kohlstedt, D.L. (1979) Load relaxation studies of four alkali halides, *Acta. Met.* 27:1187-1196, https://doi.org/10.1016/0001-6160(79)90136-6.

18. Weathers, M.S., Bird, J.M., Cooper, R.F., Kohlstedt, D.L. (1979) Differential stress determined from deformation-induced microstructures of the Moine thrust zone, *J. Geophys. Res.: Solid Earth* 84:7495-7509, https://doi.org/10.1029/jb084ib13p07495.

19. Kohlstedt, D.L., Nichols, H.P.K., Hornack, (1980) The effect of pressure on dislocation recovery in olivine, *J. Geophys. Res.: Solid Earth* 85:3122-3130, https://doi.org/10.1029/jb085ib06p03122.

20. Chiang, S.-W., Carter, C.B., Kohlstedt, D.L. (1980) Faulted dipoles in germanium: A high-resolution transmission electron microscopy study, *Phil. Mag. A* 42:103-121, https://doi.org/10.1080/01418618008239358.

21. Chiang, S.-W., Carter, C.B., Kohlstedt, D.L. (1980) Constricted segments on faulted dipoles in germanium, *Scripta Met.* 14:803-807, https://doi.org/10.1016/0036-9748(80)90293-8.

22. Carter, C.B., Kohlstedt, D.L., Sass, S.L. (1980) Electron diffraction and microscopy studies of the structure of grain boundaries in Al_2O_3, *J. Am. Ceram. Soc.* 63:623-627, https://doi.org/10.1111/j.1151-2916.1980.tb09848.x.

23. Bassett, W.A., Bird, J.M., Weathers, M.S., Kohlstedt, D.L. (1980) Josephinite: Crystal structures and phase relations of the metals, *Phys. Earth Planet. Inter.* 223:255-261, https://doi.org/10.1016/0031-9201(80)90121-1.

24. Brace, W.F., Kohlstedt, D.L. (1980) Limits on lithospheric stress imposed by laboratory experiments, *J. Geophys. Res.: Solid Earth* 85:6248-6252, https://doi.org/10.1029/jb085ib11p06248.

25. Kohlstedt, D.L., Weathers, M.S. (1980) Deformation-induced microstructures, paleopiezometers, and differential stresses in deeply eroded fault zones, *J. Geophys. Res.: Solid Earth* 85:6269-6285, https://doi.org/10.1029/jb085ib11p06269.

26. Lerner, I., Kohlstedt, D.L. (1981) Effect of γ radiation on plastic flow of NaCl, *J. Am. Ceram. Soc.* 64:105-108, https://doi.org/10.1111/j.1151-2916.1981.tb09585.x.

27. Carter, C.B., Kohlstedt, D.L. (1981) Electron irradiation damage in natural quartz grains, *Phys. Chem. Minerals* 7:110-116, https://doi.org/10.1007/bf00308226.

28. Kohlstedt, D.L., Hornack, P. (1981) The effect of oxygen partial pressure on creep in olivine, in *Anelasticity in the Earth*, *Geodynamic Series*, eds. F.D. Stacey, M.S. Paterson, A. Nicolas, American Geophysical Union, Washington, vol. 4, pp. 101-107, https://doi.org/10.1029/gd004p0101.

29. Vaughan, P.J., Kohlstedt, D.L. (1981) Cation stacking faults in magnesium germanate spinel, *Phys. Chem. Minerals* 7:241-245, https://doi.org/10.1007/bf00311975.

30. Lerner, I., Kohlstedt, D.L. (1982) Load relaxation studies of AgCl, *Acta Met.* 30:225-233, https://doi.org/10.1016/0001-6160(82)90060-8.

31. Cooper, R.F., Kohlstedt, D.L. (1982) Interfacial energies in the olivine-basalt system, in *High-Pressure Research in Geophysics, Advances in Earth and Planetary Sciences*, eds. S. Akimota, M.H. Manghnani, Center for Academic Publications Japan, Tokyo, vol. 12, pp. 217-228, https://doi.org/10.1007/978-94-009-7867-6_17.

32. Vaughan, P.J., Kohlstedt, D.L., Waff, H.S. (1982) Distribution of the glass phase in hot-pressed, olivine-basalt aggregates: An electron microscopy study, *Contrib. Mineral. Petrol.* 81:253-261, https://doi.org/10.1007/bf00371679.

33. Ricoult, D.L., Kohlstedt, D.L. (1983) Structural width of low-angle grain boundaries in olivine, *Phys. Chem. Minerals* 9:133-138, https://doi.org/10.1007/bf00308370.

34. Ricoult, D.L., Kohlstedt, D.L. (1983) Low-angle grain boundaries in olivine, in *Character of Grain Boundaries, Advances in Ceramics*, eds. M.F. Yan, A.H. Heuer, American Ceramic Society, Columbus, vol. 6, pp. 59-72.

35. Dodsworth, J., Carter, C.B., Kohlstedt, D.L. (1983) Formation of grain boundaries in MgO by deformation, in *Character of Grain Boundaries, Advances in Ceramics*, eds. M.F. Yan, A.H. Heuer, American Ceramic Society, Columbus, vol. 6, pp. 73-84.

36. Dodsworth, J., Kohlstedt, D.L., Carter, C.B. (1983) Grain boundaries in transition-metal carbides, in *Character of Grain Boundaries, Advances in Ceramics*, eds. M.F. Yan, A.H. Heuer, American Ceramic Society, Columbus, vol. 6, pp. 102-109.

37. Quinn, C.J., Kohlstedt, D.L. (1984) Solid-state reaction between titanium carbide and titanium metal, *J. Am. Ceram. Soc.* 67:305-310, https://doi.org/10.1111/j.1151-2916.1984.tb19527.x.

38. Quinn, C.J., Kohlstedt, D.L. (1984) Reactive processing of titanium carbide with titanium: Part 1. Liquid-phase sintering, *J. Mater. Sci.* 19:1229-1241, https://doi.org/10.1007/bf01120033.

39. Quinn, C.J., Kohlstedt, D.L. (1984) Reactive processing of titanium carbide with titanium: Part 2. Solid-state hot pressing, *J. Mater. Sci.* 19:1242-1250, https://doi.org/10.1007/bf01120034.

40. Cooper, R.F., Kohlstedt, D.L. (1984) Sintering of olivine and olivine-basalt aggregates, *Phys. Chem. Minerals* 11:5-16, https://doi.org/10.1007/bf00309372.

41. Kohlstedt, D.L., Ricoult, D.L. (1983) High-temperature creep of olivines, in *Deformation of Ceramics II*, eds. R.E. Tressler,R.C. Bradt, Plenum Publishing Corp., New York, 251-280, https://doi.org/10.1007/978-1-4615-6802-5_18.

42. Cooper, R.F., Kohlstedt, D.L. (1984) Solution-precipitation enhanced diffusional creep of partially molten olivine-basalt aggregates during hot-pressing, *Tectonophys.* 107:207-233, https://doi.org/10.1016/0040-1951(84)90252-x.

43. Olsen, T.S., Kohlstedt, D.L. (1985) Analysis of dislocations in some naturally deformed plagioclase feldspars, *Phys. Chem. Minerals* 11:153-160, https://doi.org/10.1007/bf00387845.

44. Durham, W.B., Ricoult, D.L., Kohlstedt, D.L. (1985) Interaction of slip systems in olivine, in *Point Defects in Minerals*, ed. R.N. Schock, American Geophysical Union, Washington, 185-193, https://doi.org/10.1029/gm031p0185.

45. Ricoult, D.L., Kohlstedt, D.L. (1985) Experimental evidence for the effect of chemical environment upon the creep rate of olivine, in *Point Defects in Minerals*, ed. R.N. Schock, Amer. Geophys. Union, Washington, 171-184, https://doi.org/10.1029/gm031p0171 .

46. Olsen, T.S., Kohlstedt, D.L. (1985) Natural deformation and recrystallization of some intermediate plagioclase feldspars, *Tectonophys.* 111:107-131, https://doi.org/10.1016/0040-1951(85)90067-8.

47. Ricoult, D.L., Kohlstedt, D.L. (1985) Creep of Co_2SiO_4 and Fe_2SiO_4 crystals in a controlled thermodynamic environment, *Phil. Mag. A* 51:79-93, https://doi.org/10.1080/01418618508245271.

48. Mackwell, S.J., Kohlstedt, D.L., Paterson, M.S. (1985) The role of water in the deformation of olivine single crystals, *J. Geophys. Res.: Solid Earth* 90:11,319-11,333, https://doi.org/10.1029/jb090ib13p11319.

49. Wolfenstine, J., Dimos, D., Kohlstedt, D.L. (1985) Decomposition of Ni_2SiO_4 in an oxygen potential gradient, *J. Am. Ceram. Soc.* 68:C117-C118, https://doi.org/10.1111/j.1151-2916.1985.tb15325.x.

50. Chiang, S.-W., Kohlstedt, D.L. (1985) Load relaxation studies of germanium, *J. Mater. Sci.* 20:736-755, https://doi.org/10.1007/bf01026549.

51. Cooper, R.F., Kohlstedt, D.L. (1986) Rheology and structure of olivine-basalt partial melts, *J. Geophys. Res.: Solid Earth* 91:9315-9323, https://doi.org/10.1029/jb091ib09p09315.

52. Sura, V.M., Kohlstedt, D.L. (1986) Inelastic Deformation of (Ti,V)C Alloys: Part 1. Hot-pressing kinetics, *J. Mater. Sci.* 21:2347-2355, https://doi.org/10.1007/bf01114278.

53. Sura, V.M., Kohlstedt, D.L. (1986) Inelastic deformation of (Ti,V)C alloys: Part 2. Load relaxation studies, *J. Mater. Sci.* 21, 2356-2364, https://doi.org/10.1007/bf01114279.

54. Mackwell, S.J., Kohlstedt, D.L. (1986) High-temperature deformation of forsterite crystals doped with vanadium, *Phys. Chem. Minerals* 13:351-356, https://doi.org/10.1007/bf00308354.

55. Ricoult, D.L., Kohlstedt, D.L. (1986) Creep behavior of single crystals of vanadium-doped forsterite, *J. Am. Ceram. Soc.* 69:770-774, https://doi.org/10.1111/j.1151-2916.1986.tb07339.x.

56. Mackwell, S.J., Kohlstedt, D.L. (1987) High-temperature stability of San Carlos olivine, *Contrib. Mineral. Petrol.* 95:226-230, https://doi.org/10.1007/bf00381272.

57. Kohlstedt, D.L., Chopra, P.N. (1987) Measurement of rock deformation at high temperatures, in *Methods of Experimental Physics: Geophysics, Laboratory Measurements*, Part A, eds. C.G. Sammis, T.L. Henyey, Academic Press, New York, vol. 24, pp. 57-87, https://doi.org/10.1016/s0076-695x(08)60584-0.

58. Sura, V.M., Kohlstedt, D.L. (1987) State-variable analysis of inelastic deformation of TiC single crystals, *J. Am. Ceram. Soc.* 70:315-320, https://doi.org/10.1111/j.1151-2916.1987.tb05000.x.

59. Dimos, D., Kohlstedt, D.L. (1987) Diffusional creep and kinetic demixing in yttria-stabilized zirconia, *J. Am. Ceram. Soc.* 70, 531-536, https://doi.org/10.1111/j.1151-2916.1987.tb05700.x (1987).

60. Luecke, W., Kohlstedt, D.L. (1988) Kinetics of the internal oxidation of (Mg,Fe)O solid solutions, *J. Am. Ceram. Soc.* 71:189-196, https://doi.org/10.1111/j.1151-2916.1988.tb05027.x.

61. Wu, T., Kohlstedt, D.L. (1988) A rutherford backscattering spectroscopy study of kinetics of oxidation of $(Mg,Fe)_2SiO_4$, *J. Am. Ceram. Soc.* 71:540-545, https://doi.org/10.1111/j.1151-2916.1988.tb05917.x.

62. Skrotzki, W., Wendt, H., Carter, C.B., Kohlstedt, D.L. (1988) The relation between the structure and mechanical properties of a Σ=51 tilt boundary in germanium, *Acta Met.* 36:983-994, https://doi.org/10.1016/0001-6160(88)90153-8.

63. Skrotzki, W., Wendt, H., Carter, C.B., Kohlstedt, D.L. (1988) Secondary dislocations in [011] tilt boundaries in germanium, *Phil. Mag. A* 57:383-409, https://doi.org/10.1080/01418618808204676.

64. Beeman, M.L., Kohlstedt, D.L. (1988) Dislocation density-stress relationships in natural and synthetic sodium chloride, *Tectonophys.* 149:147-161, https://doi.org/10.1016/0040-1951(88)90167-9.

65. Mackwell, S.J., Dimos, D., Kohlstedt, D.L. (1988) Transient creep of olivine: Point defect relaxation times, *Phil. Mag. A* 57:779-789, https://doi.org/10.1080/01418618808209920.

66. Dimos, D., Wolfenstine, Kohlstedt, D.L. (1988) Kinetic demixing and decomposition of multicomponent oxides due to a nonhydrostatic stress, *Acta Met.* 36:1543-1552, https://doi.org/10.1016/0001-6160(88)90222-2.

67. Dimos, D., Kohlstedt, D.L., Schmalzried, H. (1988) High-temperature creep and kinetic demixing in (Co,Mg)O, *J. Am. Ceram. Soc.* 71:732-741, https://doi.org/10.1111/j.1151-2916.1988.tb06406.x.

68. Wolfenstine, Kohlstedt, D.L. (1988) Creep of (Mg,Fe)O single crystals, *J. Mater. Sci.* 23:3550-3557, https://doi.org/10.1007/bf00540494.

69. Cooper, R.F., Kohlstedt, D.L., Chyung (1989) Solution-precipitation enhanced creep in solid-liquid aggregates which display a non-zero dihedral angle, *Acta Met.* 37:1759-1771, https://doi.org/10.1016/0001-6160(89)90061-8.

70. Burlitch, J.M. DeMott, G.J., Kohlstedt, D.L. (1989) Adhesion of metals to mixed oxide coatings (Al & Cr, Mo, or W) prepared by spray pyrolysis of organometallics, in *Chemical Perspectives of Microelectronic Materials, Mat. Res. Soc. Sym. Proc.* eds. M.E. Gross, J.M. Jasinski, J.T. Yates, Jr., Materials Research Society, Pittsburgh, PA, vol. 131, pp. 453-458, https://doi.org/10.1557/proc-131-453.

71. Mackwell, S.J., Bai, Q., Kohlstedt, D.L. (1990) Rheology of olivine and the strength of the lithosphere *Geophys. Res. Lett.* 17:9-12, https://doi.org/10.1029/gl017i001p00009.

72. Mackwell, S.J., Kohlstedt, D.L. (1990) Diffusion of hydrogen in olivine: Implications for water in the mantle, *J. Geophys. Res.: Solid Earth* 95:5079-5088, https://doi.org/10.1029/jb095ib04p05079.

73. Mackwell, S.J., Kohlstedt, D.L., Durham, W.B. (1990) High-resolution creep apparatus, in *The Brittle-Ductile Transition in Rocks, The Heard Volume*, eds. A.G. Duba, W.B. Durham, J.W. Handin, W.F. Wang, American Geophysical Union, Washington, 235-238, https://doi.org/10.1029/gm056p0235.

74. Kohlstedt, D.L. (1990) Chemical analysis of grain boundaries in an olivine-basalt aggregate using high-resolution analytical electron microscopy, in *The Brittle-Ductile Transition in Rocks, The Heard Volume*, eds. A.G. Duba, W.B. Durham, J.W. Handin, W.F. Wang, American Geophysical Union, Washington, 211-218, https://doi.org/10.1029/gm056p0211.

75. Riley, Jr., G.N., Kohlstedt, D.L. (1990) An experimental study of melt migration in an olivine-melt system, in *Magma Transport and Storage*, ed. M.P. Ryan, John Wiley & Sons, New York, 77-86.

76. Riley, Jr., G.N., Kohlstedt, D.L., Richter, F.M. (1990) Melt migration in a silicate liquid-olivine system: an experimental test of compaction theory, *Geophys. Res. Lett.* 17:2101-2104, https://doi.org/10.1029/gl017i012p02101.

77. Luecke, W., Kohlstedt, D.L., Dawes, S.B. (1990) Oxidation of SiC-ZrO_2 composites, *J. Mat. Sci.* 25:5118-5124, https://doi.org/10.1007/bf00580139.

78. Bai, Q., Mackwell, S.J., Kohlstedt, D.L. (1991) High-temperature creep of olivine single crystals: 1. Mechanical results for buffered samples, *J. Geophys. Res.: Solid Earth* 96:2441-2463, https://doi.org/10.1029/90jb01723.

79. Kanai, H., DeMott, G.J., Kohlstedt, D.L. (1991) Adhesion of chromium metallization on alumina surfaces prepared by sol-gel techniques, *J. Mat. Sci.* 26:1815-1820, https://doi.org/10.1007/bf00543608.

80. Wanamaker, B.J., Kohlstedt, D.L. (1991) Effect of melt composition on the wetting angle between silicate melts and olivine, *Phys. Chem. Minerals* 18:26-36, https://doi.org/10.1007/bf00199040.

81. Burlitch, J.M., Beeman, M.L., Riley, G.N., Kohlstedt, D.L. (1991) Low-temperature synthesis of olivine and forsterite facilitated by hydrogen peroxide, *Chem. Mater.* 3:692-698, https://doi.org/10.1021/cm00016a024.

82. Riley, Jr., G.N., Kohlstedt, D.L. (1991) Kinetics of melt migration in upper mantle-type rocks, *Earth Planet. Sci. Lett.* 105:500-521, https://doi.org/10.1016/0012-821x(91)90188-n.

83. Venkataraman, S., Kohlstedt, D.L., Gerberich, W.W. (1992) Microscratch analysis of the work of adhesion for Pt thin films on NiO, *J. Mat. Res. Soc.* 7:1126-1132, https://doi.org/10.1557/jmr.1992.1126.

84. Bai, Q., Kohlstedt, D.L. (1992) High-temperature creep of olivine single crystals: 2. Dislocation microstructures, *Tectonophys.* 206:1-29, https://doi.org/10.1016/0040-1951(92)90365-d.

85. Bai, Q., Kohlstedt, D.L. (1992) Substantial hydrogen solubility in olivine and implications for water storage in the mantle, *Nature* 357:672-674, https://doi.org/10.1038/357672a0.

86. Venkataraman, S., Kohlstedt, D.L., Gerberich, W.W. (1992) Continuous microindentation and microscratch measurements of metal-ceramic adhesive strengthsin *Thin Films: Stresses and Mechanical Properties III, Mat. Res. Soc. Symp. Proc.*, eds. W.D. Nix, J.C. Bravman, E. Arzt, L.B. Freund, Materials Research Society, Boston, MA, vol. 239, pp. 591-597, https://doi.org/10.1557/proc-239-591.

87. Riley, Jr., G.N., Kohlstedt, D.L. (1992) The influence of H_2O and CO_2 on melt migration in two silicate liquid-olivine systems, in *Fault Mechanics and Transport Properties of Rock: A Festschrift in Honor of W.F. Brace*, eds. B. Evans, T.-F. Wong, Academic Press, New York, 281-293, https://doi.org/10.1016/s0074-6142(08)62826-0.

88. Bai, Q., Kohlstedt, D.L. (1992) High-temperature creep of olivine single crystals III. Mechanical results for unbuffered samples, *Phil. Mag.* 66:1149-1181, https://doi.org/10.1080/01418619208248011.

89. Kohlstedt, D.L. (1992) Structure, rheology and permeability of partially molten rocks at low melt fractions, in *Mantle Flow and Melt Generation at Mid-Ocean Ridges, Geophys. Monogr. 71*, eds. J. Phipps-Morgan, D.K. Blackman, J.M. Sinton, American Geophysical Union, Washington, 103-121, https://doi.org/10.1029/gm071p0103.

90. Daines, M.J., Kohlstedt, D.L. (1993) A laboratory study of melt migration, *Phil. Trans. R. Soc. Lond. A* 342:43-52, https://doi.org/10.1098/rsta.1993.0003.

91. Beeman, M.L., Kohlstedt, D.L. (1993) Deformation of olivine-melt aggregates at high temperatures and confining pressures, *J. Geophys. Res.: Solid Earth* 98:6443-6452, https://doi.org/10.1029/92jb02697.

92. Bai, Q., Kohlstedt, D.L. (1993) Effects of chemical environment on the solubility and incorporation mechanism for hydrogen in olivine, *Phys. Chem. Min.* 19:460-471, https://doi.org/10.1007/bf00203186.

93. Fujino, K., Nakazaki, H., Momoi, H., Karato, S., Kohlstedt, D.L. (1993) TEM observations of dissociated dislocations with **b** = [010] in naturally deformed olivine, *Phys. Earth Planet. Inter.* 78:131-137, https://doi.org/10.1016/0031-9201(93)90089-r.

94. Venkataraman, S., Nelson, J.C., Hsieh, A.J., Kohlstedt, D.L., Gerberich, W.W. (1993) Continuous microscratch measurement of thin film adhesion strengths, *J. Adhesion Sci. Technol.* 7, 1279-1292, https://doi.org/10.1163/156856193x00105.

95. Venkataraman, S., Kohlstedt, D.L., Gerberich, W.W. (1993) Continuous microindentation of passivating surfaces, *J. Mater. Res.* 8:685-688, https://doi.org/10.1557/jmr.1993.0685.

96. Venkataraman, S., Kohlstedt, D.L., Gerberich, W.W. (1994) Metal-ceramic interfacial fracture resistance using the continuous microscratch technique, *Thin Solid Films* 223:269-275, https://doi.org/10.1016/0040-6090(93)90532-t.

Reprinted in *Adhesion Measurement of Films and Coatings,* ed. K.L. Mittal, VSP International Science Publishers, Zeist, The Netherlands, 161-174 (1994).

97. Jin, Z.M., Bai, Q., Kohlstedt, D.L. (1994) Creep of olivine crystals from four localities, *Phys. Earth Planet. Int.* 82:55-64, https://doi.org/10.1016/0031-9201(94)90102-3.

98. Versteeg, V.A., Kohlstedt, D.L. (1994) Internal friction in lithium aluminosilicate glass-ceramics, *J. Am. Ceram. Soc.* 77:1169-1177, https://doi.org/10.1111/j.1151-2916.1994.tb05389.x.

99. Daines, M.J., Kohlstedt, D.L. (1994) The transition from porous to channelized flow due to melt/rock reaction during melt migration, *Geophys. Res. Lett.* 21:145-148, https://doi.org/10.1029/93gl03052.

100. Kohlstedt, D.L., Chopra, P.N. (1994) Influence of basaltic melt on the creep of polycrystalline olivine under hydrous conditions, in *Magmatic Systems*, ed. M.P. Ryan, Academic Press, New York, 37-53, https://doi.org/10.1016/s0074-6142(09)60091-7.

101. Wolfenstine, Kohlstedt, D.L. (1994) High-temperature creep and kinetic decomposition of Ni_2SiO_4, *Phys. Chem. Minerals* 21:234-243, https://doi.org/10.1007/bf00202137.

102. Lu, Y.-C., Sass, S.L., Bai, Q., Kohlstedt, D.L., Gerberich, W.W. (1995) The influence of interfacial reactions on the fracture toughness of Ti-Al_2O_3 interfaces, *Acta metall. mater.* 43:31-41, https://doi.org/10.1016/0956-7151(95)90258-9.

103. Hirth, G., Kohlstedt, D.L. (1995) Experimental constraints on the dynamics of the partially molten upper mantle. Deformation in the diffusion creep regime, *J. Geophys. Res.: Solid Earth* 100:1981-2001, https://doi.org/10.1029/94jb02128.

104. Hirth, G., Kohlstedt, D.L. (1995) Experimental constraints on the dynamics of the partially molten upper mantle: 2. Deformation in the dislocation creep regime, *J. Geophys. Res.: Solid Earth* 100:15,441-15,449, https://doi.org/10.1029/95jb01292.

105. Gerberich, W.W., Venkataraman, S.K., Huang, H., Harvey, S.E., Kohlstedt, D.L. (1995) The injection of plasticity by millinewton Contacts, *Acta Metall. Mater.* 43:1569-1576, https://doi.org/10.1016/0956-7151(94)00351-h.

106. Goldsby, D.L., Kohlstedt, D.L. (1995) Diffusion creep in ice, in *Rock Mechanics: Proceedings of the 35th U.S. Symposium*, eds. J.J.K. Daemen, R.A. Schultz, A.A. Balkema, Rotterdam, 199-206.

107. Mackwell, S.J., Zimmerman, M.E., Kohlstedt, D.L., Scherber, D.S. (1995) Experimental deformation of dry Columbia diabase: Implications for tectonics on Venus, in *Rock Mechanics: Proceedings of the 35th U.S. Symposium*, eds. J.J.K. Daemen , R.A. Schultz, A.A. Balkema, Rotterdam, 207-214.

108. Kohlstedt, D.L., Evans, B., Mackwell, S.J. (1995) Strength of the lithosphere: Constraints imposed by laboratory experiments, *J. Geophys. Res.: Solid Earth* 100:17587-17602, https://doi.org/10.1029/95jb01460.

109. Evans, B., Kohlstedt, D.L. (1995) Rheology of rocks, in *Rock Physics and Phase Relations: A Handbook of Physical Constants*, ed. T.J. Ahrens, American Geophysical Union, Washington, 148-165, https://doi.org/10.1029/RF003p0148.

110. Bai, Q., Wang, Z.-C., Kohlstedt, D.L. (1995) Manganese olivine I: Electrical conductivity, *Phys. Chem. Mineral.* 22:489-503, https://doi.org/10.1007/bf00209374.

111. Kohlstedt, D.L., Zimmerman, M.E. (1996) Rheology of partially molten mantle Rocks, *Annu. Rev. Earth Planet. Sci.*, 24:41-62, https://doi.org/10.1146/annurev.earth.24.1.41.

112. Kohlstedt, D.L., Keppler, H., Rubie, D.C. (1996) Solubility of water in the α, β and γ phases of $(Mg,Fe)_2SiO_4$, *Contrib. Mineral. Petrol.* 123:345-357, https://doi.org/10.1007/s004100050161.

113. Hirth, G., Kohlstedt, D.L. (1996) Water in the oceanic upper mantle: implications for rheology, melt extraction and the evolution of the lithosphere, *Earth Planet. Sci. Lett.* 144:93-108, https://doi.org/10.1016/0012-821x(96)00154-9.

114. Venkataraman, S., Kohlstedt, D.L., Gerberich, W.W. (1996) Continuous microscratch measurements of the practical and true works of adhesion for metal/ceramic systems, *J. Mater. Res.* 11:3133-3145, https://doi.org/10.1557/jmr.1996.0398.

115. Daines, M.J., Kohlstedt, D.L. (1997) Influence of deformation on melt topology in peridotites, *J. Geophys. Res.: Solid Earth* 102:10257-10271, https://doi.org/10.1029/97jb00393.

116. Goldsby, D.L., Kohlstedt, D.L. (1997) Grain boundary sliding in fine-grained ice I, *Scripta Mat.* 37:1399-1406, https://doi.org/10.1016/s1359-6462(97)00246-7.

117. Jones, S.A., Wong, S., Burlitch, J.M., Viswanathan, S., Kohlstedt, D.L. (1997) Sol-gel synthesis and characterization of magnesium silicate thin films, *Chem. Materials* 9:2567-2576, https://doi.org/10.1021/cm970401m.

118. Mackwell, S.J., Zimmerman, M.E., Kohlstedt, D.L. (1998) High-temperature deformation of dry diabase with application to tectonics on Venus, *J. Geophys. Res.: Solid Earth* 103:975-984, https://doi.org/10.1029/97jb02671.

119. Bai, Q., Wang, Z.-C., Kohlstedt, D.L. (1998) Manganese olivine II: Point defect relaxation, *Phys. Chem. Mineral.* 25:122-129, https://doi.org/10.1007/s002690050094.

120. Kohlstedt, D.L., Mackwell, S.J. (1998) Diffusion of hydrogen and intrinsic point defects in olivine, *Zeitschrift für Physikalische Chemie* 207:147-162, https://doi.org/10.1524/zpch.1998.207.part_1_2.147.

121. Karato, S., Zhang, S., Zimmerman, M.E., Daines, M.J., Kohlstedt, D.L. (1998) Shear deformation of mantle materials: Towards structural geology of the mantle, *Pure Appl. Geophys.* 14:589-603, https://doi.org/10.1007/978-3-0348-8777-9_20.

122. Zimmerman, M.E., Zhang, S., Kohlstedt, D.L., Karato, S. (1999) Melt distribution in mantle rocks deformed in shear, *Geophys. Res. Lett.* 26:1505-1508, https://doi.org/10.1029/1999gl900259 (1999).

123. Kohlstedt, D.L., Mackwell, S.J. (1999) Solubility and diffusion of 'water' in silicate minerals, in *Microscopic Properties and Processes in Minerals*, eds. K. Wright, R. Catlow, Kluwer Acad. Pub., 539-559, https://doi.org/10.1007/978-94-011-4465-0_24.

124. Kohlstedt, D.L., Bai, Q., Wang, Z.-C., Mei, S. (2000) Rheology of partially molten rocks, in *Physics and Chemistry of Partially Molten Rocks*, eds. N. Bagdassarov, D. Laporte, A.B. Thompson, Kluwer Acad. Publ., 3-28, https://doi.org/10.1007/978-94-011-4016-4_1.

125. Bruhn, D., Groebner, N., Kohlstedt, D.L. (2000) An interconnected network of core-forming melts produced by shear deformation, *Nature* 403:883-886, https://doi.org/10.1038/35002558.

126. Mei, S., Kohlstedt, D.L. (2000) Influence of water on plastic deformation of olivine aggregates: 1. Diffusion creep regime, *J. Geophys. Res.: Solid Earth* 105:21457-21469, https://doi.org/10.1029/2000jb900179.

127. Mei, S., Kohlstedt, D.L. (2000) Influence of water on plastic deformation of olivine aggregates: 2. Dislocation creep regime, *J. Geophys. Res.: Solid Earth* 105:21471-21481, https://doi.org/10.1029/2000jb900180.

128. Peltier, W.R., Goldsby, D.L., Kohlstedt, D.L., Tarasov, L. (2000) Ice-age, ice-sheet rheology: constraints from the last glacial maximum form of the Laurentide ice sheet, *Annals of Glaciology* 30, 163-176, https://doi.org/10.3189/172756400781820859.

129. Goldsby, D.L., Kohlstedt, D.L. (2001) Superplastic deformation of ice: Experimental observations, *Geophys. Res.* 10:11017-11030, https://doi.org/10.1029/2000JB900336.

130. Nair, B.G., Cooper, R.F., Bruhn, D., Kohlstedt, D.L. (2001) High-temperature rheology of calcium aluminosilicate (anorthite) glass-ceramics under uniaxial and triaxial loading, *J. Am. Ceram. Soc.* 84:2617-2624, https://doi.org/10.1111/j.1151-2916.2001.tb01062.x.

131. Mei, S., Bai, W., Hiraga, T., Kohlstedt, D.L. (2002) Influence of melt on creep behavior of olivine-basalt aggregates under hydrous conditions, *Earth Planet. Sci. Lett.* 201:491-507, https://doi.org/10.1016/S0012-821X(02)00745-8.

132. Hiraga, T., Nishikawa, O., Nagase, T., Akizuki, M., Kohlstedt, D.L. (2002) Interfacial energies for quartz and albite in pelitic schists, *Contrib. Mineral. Petrol.* 143:664-672, https://doi.org/10.1007/s00410-002-0375-4.

133. Hiraga, T., Anderson, I.M., Zimmerman, M.E., Mei, S., Kohlstedt, D.L. (2002) Structure and chemistry of grain boundaries in deformed olivine + basalt and partially molten lherzolite aggregates: Evidence of melt-free grain boundaries, *Contrib. Mineral. Petrol.,* 144:163-175, https://doi.org/10.1007/s00410-002-0394-1.

134. Goldsby, D.L., Kohlstedt, D.L. (2002) Reply to comment by P. Duval, M. Montagnat on ‘‘Superplastic deformation of ice: Experimental observations, *J. Geophys. Res.: Solid Earth* 107:B11, 2313, https://doi.org/10.1029/2002JB001842.

135. Kohlstedt, D.L. (2002) Partial melting and deformation, in *Plastic Deformation in Minerals and Rocks*, eds. S.I. Karato, H.R. Wenk, Reviews in Mineralogy and Geochemistry, Mineralogical Society of America, vol. 51, pp. 105-125, https://doi.org/10.2138/rmg.2002.51.5.

136. Holtzman, B.K., Groebner, N.J., Zimmerman, M.E., Ginsberg, S.B., Kohlstedt, D.L. (2003) Deformation-driven melt segregation in partially molten rocks, *Geochem., Geophys., Geosyst.,* 4:5, 8607, https://doi.org/10.1029/2001GC000258 (2003).

137. Hiraga, T., Anderson, I.M., Kohlstedt, D.L. (2003) Chemistry of grain boundaries in mantle rocks, *Amer. Min.* 88:1015-1019, https://doi.org/10.2138/am-2003-0709.

138. Holtzman, B.K., Kohlstedt, D.L., Zimmerman, M.E., Heidelbach, F., Hiraga, T., Hustoft, J. (2003) Melt segregation and strain partitioning: implications for seismic anisotropy and mantle flow, *Science* 301:1227-1230, https://doi.org/10.1126/science.1087132.

139. Hirth, G., Kohlstedt, D.L. (2003) Rheology of the upper mantle and the mantle wedge: A view from the experimentalists, in *Inside the Subduction Factory*, ed. J. Eiler, Geophysical Monograph 138, 83-105, American Geophysical Union, Washington, D.C., https://doi.org/10.1029/138GM06.

140. Hiraga, T., Anderson, I.M., Kohlstedt, D.L. (2004) Partitioning in mantle rocks: Grain boundaries as reservoirs of incompatible elements, *Nature* 427:699-703, https://doi.org/10.1038/nature02259.

141. Xu, Y., Zimmerman, M.E., Kohlstedt, D.L. (2004) Deformation behavior of partially molten mantle rocks, *Rheology and Deformation of the Lithosphere at Continental Margins*: *MARGINS Theoretical and Experimental Earth Science Series. Volume I* eds. G.D. Karner, N.W. Driscoll, B. Taylor, D.L. Kohlstedt, Columbia University Press, 284-310, https://doi.org/10.7312/karn12738-011.

142. Zimmerman, M.E., Kohlstedt, D.L. (2004) Rheological properties of partially molten lherzolite, *J. Petrol.* 45:275-298, https://doi.org/ 10.1093/petrology/egg089.

143. Zhao, Y.H., Ginsberg, S.B., Kohlstedt, D.L. (2004) Solubility of hydrogen in olivine: Effects of temperature and Fe content, *Contrib. Mineral. Petrol.* 147:155-161, https://doi.org/10.1007/s00410-003-0524-4.

144. Wang, Z., Hiraga, T., Kohlstedt, D.L. (2004) Effect of H^+ on Fe-Mg interdiffusion in olivine, $(Mg,Fe)_2SiO_4$, *Appl. Phys. Lett.* 85:209-211, https://doi.org/10.1063/1.1769593.

145. Hier-Majumder, S., Leo, P.H., Kohlstedt, D.L. (2004) On grain boundary wetting during deformation, *Acta Mater.* 52:3425-3433, https://doi.org/10.1016/j.actamat.2004.03.040.

146. Hier-Majumder, S., Anderson, I.M., Kohlstedt, D.L. (2005) Influence of protons on Fe-Mg interdiffusion in olivine, *J. Geophys. Res.: Solid Earth* 110:B02202, https://doi.org/10.1029/2004JB003292.

147. Bruhn, D., Kohlstedt, D.L., Lee K.-H. (2005) The effect of grain size and melt distributions on the rheology of partially molten olivine aggregates, in *High Strain Zones: Structure and Physical Properties,* eds. D. Bruhn, L. Burlini, Geological Society, London, Special Publications, 245:291-302, https://doi.org/10.1144/GSL.SP.2005.245.01.14.

148. Hier-Majumder, S., Mei, S., Kohlstedt, D.L. (2005) Water weakening of clinopyroxene in the diffusion creep regime, *J. Geophys. Res.: Solid Earth* 110:B07406, https://doi.org/10.1029/2004JB003414.

149. Holtzman, B.K., Kohlstedt, D.L., Phipps Morgan, J. (2005) Viscous energy dissipation and strain partitioning in partially molten rocks, *J. Petrol.* 46:2569-2592, https://doi.org/10.1093/petrology/egi065.

150. Heidelbaach, F., Holtzman, B.K., Hier-Majumder, S., Kohlstedt, D.L. (2005) Textures in experimentally deformed olivine aggregates: The effects of added water and melt, *Materials Science Forum* 495-497:63-68, https://doi.org/10.4028/www.scientific.net/MSF.495-497.63 (2005).

151. Hustoft, J.W., Kohlstedt, D.L. (2006) Metal-silicate segregation in deforming dunitic rocks, *Geochem., Geophys., Geosyst.* 7:Q02001, https://doi.org/10.1029/2005GC001048.

152. Groebner, N., Kohlstedt, D.L. (2006) Deformation-induced metal melt networks in silicates: Implications for core-mantle interactions in planetary bodies, *Earth Planet. Sci. Lett.* 245:571-580, https://doi.org/10.1016/j.epsl.2006.03.029.

153. Hier-Majumder, S., Kohlstedt, D.L. (2006) Role of dynamic grain boundary wetting in fluid circulation beneath volcanic arcs, *Geophys. Res. Lett.* 33:L08305, https://doi.org/10.1029/2006GL025716.

154. Scott, T., Kohlstedt, D.L. (2006) The effect of large melt fraction on the deformation behavior of Peridotite, *Earth Planet. Sci. Lett.* 246:177-187, http://dx.doi.org/10.1016/j.epsl.2006.04.027.

155. Chen, S., Hiraga, T., Kohlstedt, D. L. (2006) Water weakening of clinopyroxene in the dislocation creep regime, *J. Geophys. Res.: Solid Earth* 111:B08203, https://doi.org.10.1029/2005JB003885.

156. Kohlstedt, D.L. (2006) The role of water in high-temperature rock deformation, in *Water in Nominally Anhydrous Minerals*, eds. H. Keppler, J.R. Smyth, Reviews in Mineralogy and Geochemistry, Mineralogical Society of America, vol. 62, pp. 377-396, https://doi.org/10.2138/rmg.2006.62.16.

157. Hiraga, T., Kohlstedt, D. L. (2007) Equilibrium interface segregation in the diopside-forsterite system I: Analytical techniques, thermodynamics, and segregation characteristics, *Geochim. Cosmochim. Acta* 71:1266-1280, https://doi.org/10.1016/j.gca.2006.11.019.

158. Hiraga, T., Hirschmann, M.M., Kohlstedt, D. L. (2007) Equilibrium interface segregation in the diopside-forsterite system II: Applications of interface enrichment to mantle geochemistry, *Geochim. Cosmochim. Acta* 71:1281-1289, https://doi.org/10.1016/j.gca.2006.11.020.

159. Demouchy, S., Mackwell, S.J., Kohlstedt, D.L. (2007) Influence of hydrogen on Fe-Mg interdiffusion in (Mg,Fe)O and implications for Earth's lower mantle, *Contrib. Mineral. Petrol.* 154:279-289, https://doi.org/10.1007/s00410-007-0193-9.

160. Kohlstedt, D.L. (2007) Properties of rocks and minerals – constitutive equations, rheological behavior, and viscosity of rocks, in *Treatise on Geophysics*, ed. G. Schubert, vol. 2.14, pp. 389-417, Oxford:Elsevier Ltd., https://doi.org/10.1016/b978-044452748-6/00043-2.

161. Hustoft, J.W., Scott, T., Kohlstedt, D.L. (2007) Effect of metallic melt content on the viscosity of peridotite, *Earth Planet. Sci. Lett.* 260:355-360, https://doi.org/10.1016/j.epsl.2007.06.011.

162. Holtzman, B.K., Kohlstedt, D.L. (2007) Stress-driven melt segregation and strain partitioning in partially molten rocks: The evolution of melt distribution, *J. Petrol.* 48:2379-2406, https://doi.org/10.1093/petrology/egm065.

163. Parsons, R.A., Nimmo, F., Hustoft, J.W., Holtzman, B.K., Kohlstedt, D.L. (2008) An experimental and numerical study of surface tension-driven melt flow, *Earth Planet. Sci. Lett.* 267:548-557, https://doi.org/10.1016/j.epsl.2007.11.064.

164. Kohlstedt, D.L., Mackwell, S.J. (2008) The role of protons in ionic diffusion in (Mg,Fe)O and $(Mg,Fe)_2SiO_4$, *J. Mater. Sci.* 43:4693-4700, https://doi.org/10.1007/s10853-007-2420-1.

165. Mei, S., Kohlstedt, D.L., Durham, W.B., Wang, L. (2008) Experimental investigation of the creep behavior of MgO at high pressures, *Phys. Earth Planet. Inter.* 170:170-175, https://doi.org/10.1016/j.pepi.2008.06.030.

166. Durham, W.B., Mei, S., Kohlstedt, D.L., Wang, L., Dixon, N.A. (2009) New measurements of activation volume in olivine under anhydrous conditions, *Phys. Earth Planet. Inter.* 172:67-73, https://doi.org/10.1016/j.pepi.2008.07.045.

167. Hiraga, T., Kohlstedt, D. L. (2009) Systematic distribution of incompatible elements in mantle peridotite: Importance of intra- and inter-granular melt-like components, *Contrib. Mineral. Petrol.* 158149-167, https://doi.org/10.1007/s00410-009-0375-8.

168. Kohlstedt, D.L., Holtzman, B.K. (2009) Shearing melt out of the earth: An experimentalist's perspective on the influence of deformation on melt extraction, *Ann. Rev. Earth Planet. Sci.* 37:561-593, https://doi.org/10.1146/annurev.earth.031208.100104.

169. Demouchy, S., Schneider, S.E., Mackwell, S.J., Zimmerman, M.E., Kohlstedt, D.L. (2009) Experimental deformation of olivine single crystals at lithospheric temperatures, *Geophys. Res. Lett.* 36:L04304, https://doi.org/10.1029/2008GL036611.

170. Wentzcovitch, R.M., Justo, J.F., Wu, Z., da Silva, C.R.S., Yuen, D.A., Kohlstedt, D.L. (2009) Anomalous compressibility of ferropericlase throughout the iron spin crossover, *Proc. Natl. Acad. Sci.* 106:8447-8452, https://doi.org/10.1073/pnas.0812150106.

171. Zhao, Y.-H., Zimmerman, M.E., Kohlstedt, D.L. (2009) Effect of iron content on the creep behavior of olivine: 1. Anhydrous conditions, *Earth Planet. Sci. Lett.* 287:229-240 https://doi.org/10.1016/j.epsl.2009.08.006.

172. Zimmerman, M.E., Kohlstedt, D.L., Mackwell, S.J. (2010) Stress-driven melt segregation in partially molten feldspathic rocks, *J. Petrol.* 52:9-19, https://doi.org/10.1093/petrology/egp043.

173. King, D.S., Kohlstedt, D.L., Zimmerman, M.E. (2010) Stress-driven melt segregation in partially molten rocks deformed in torsion, *J. Petrol.* 52:21-42, https://doi.org/10.1093/petrology/egp062.

174. Kohlstedt, D.L., Mackwell, S.J. (2010) Strength and deformation of planetary lithospheres, in *Planetary Tectonics*, eds. T.R. Watters, R.A. Schultz, Cambridge Univ. Press, 397-456.

175. Barber, D.J., Wenk, H.-R., Hirth, G., Kohlstedt, D.L. (2020) Chapter 95: Dislocations in minerals, in *Dislocations in Solids*, eds. J.P Hirth, L. Kubin, Elsevier North-Holland

Publishing Company, Oxford, vol. 16, pp. 171-232, https://doi.org/10.1016/S1572-4859(09)01604-0.

176. Mei, S., Suzuki, A.M., Kohlstedt, D.L., Dixon, N.A., Durham, W.B. (2010) Experimental constraints on the strength of the lithospheric mantle, *J. Geophys. Res.: Solid Earth* 115:B08204, https://doi.org/10.1029/2009JB006873.

177. Wang, Z., Zhao, Y., Kohlstedt, D.L. (2010) Dislocation creep accommodated by grain boundary sliding in dunite, *J. Earth Sci.* 21:541-554 https://doi.org/10.1007/s12583-010-0113-1.

178. Mei, S., Suzuki, A.M., Kohlstedt, D.L., Xu, L. (2010) Experimental investigation of the creep behavior of garnet at high temperatures and pressures, *J. Earth Sci.* 21:532-540, https://doi.org/10.1007/s12583-010-0127-8.

179. Keefner, J.W., Mackwell, S.J., Kohlstedt, D.L., Heidelbach, F. (2011) Dependence of the creep of dunite on oxygen fugacity: Implications for viscosity variations in Earth's mantle, *J. Geophys. Res.: Solid Earth* 116:B05201, https://doi.org/10.1029/2010JB007748.

180. King, D.S.H., Hier-Majumder, S., Kohlstedt, D.L. (2011) An experimental study of the effects of surface tension in homogenizing perturbations in melt fraction, *Earth Planet. Sci. Lett.* 307:349-360, https://doi.org/10.1016/j.epsl.2011.05.009.

181. Hansen, L.N., Zimmerman, M.E., Kohlstedt, D.L. (2011) Grain-boundary sliding in San Carlos olivine: Flow-law parameters and crystallographic-preferred orientation, *J. Geophys. Res.: Solid Earth* 116:B08201, https://doi.org/10.1029/2011JB008220.

182. Umemoto, K., Wentzcovitch, R.M., Hirschmann, M.M., Kohlstedt, D.L., Withers, A. (2011) A first-principles investigation of hydrous defects and IR frequencies in forsterite: The case for Si vacancies, *Am. Mineral.*, 96:1475-1479, https://doi.org/10.2138/am.2011.3720.

183. King, D.S.H., Holtzman, B.K., Kohlstedt, D.L. (2011) An experimental investigation of the interactions between reaction-driven and stress-driven melt segregation. 1. Application to mantle melt extraction, *Geochem., Geophys., Geosyst.* 12:Q12019, https://doi.org/10.1029/2011GC003684.

184. King, D.S.H., Holtzman, B.K., Kohlstedt, D.L. (2011) An experimental investigation of the interactions between reaction-driven and stress-driven melt segregation. 2. Disaggregation at high melt fraction, *Geochem., Geophys., Geosyst* 12:Q12020, https://doi.org/10.1029/2011GC003685.

185. Hansen, L.N., Zimmerman, M.E., Dillman, A.M., Kohlstedt, D.L. (2012) Strain localization in olivine aggregates at high Temperature: A laboratory comparison of constant-strain-rate and constant-stress boundary conditions, *Earth Planet. Sci. Lett.* 333-334:134-145, https://doi.org/10.1016/j.epsl.2012.04.016.

186. Hansen, L.N., Zimmerman, M.E., Kohlstedt, D.L. (2012) The influence of microstructure on deformation of olivine in the grain-boundary sliding regime, *J. Geophys. Res.: Solid Earth* 117:B09201, https://doi.org/10.1029/2012JB009305.

187. Holtzman, B.K., King, D.S.H., Kohlstedt, D.L. (2012) Effects of stress-driven melt segregation on the steady-state viscosity of rocks, *Earth Planet. Sci. Lett.* 359-360:184-193, https://doi.org/10.1016/j.epsl.2012.09.030.

188. Hansen, L.N., Zimmerman, M.E., Kohlstedt, D.L. (2012) Laboratory measurements of the viscous anisotropy of olivine aggregates, *Nature* 492:415-418, https://doi.org/10.1038/nature11671.

189. Wang, Y.F., Zhang, J.F., Jin, Z., Kohlstedt, D.L. (2012) Low oxygen fugacity dependency for the deformation of partially molten lherzolite, *Tectonophys.* 580:114-123, https://doi.org/10.1016/j.tecto.2012.09.001.

190. Qi, C., Zhao, Y.-H., Kohlstedt, D.L. (2013) An experimental study of pressure shadows in partially molten rocks, *Earth Planet. Sci. Lett.* 382:77-84, https://doi.org/10.1016/j.epsl.2013.09.004.

191. Xu, L., Mei, S., Dixon, N.A., Jin, Z., Suzuki, A.M., Kohlstedt, D.L. (2013) Effect of water on rheological properties of garnet at high temperatures and pressures, *Earth Planet. Sci. Lett.* 379:158-165, https://doi.org/10.1016/j.epsl.2013.08.002.

192. Hansen, L.N., Zhao, Y.-H., Zimmerman, M.E., Kohlstedt, D.L. (2014) Protracted fabric evolution in olivine: Implications for the relationship among strain, crystallographic fabric, and seismic anisotropy, *Earth Planet. Sci. Lett.* 387:157-168, https://doi.org/10.1016/j.epsl.2013.11.009.

193. Kohlstedt, D.L., Hansen, L.N. (2015) Constitutive equations, rheological behavior, and viscosity of rocks, in *Treatise on Geophysics*, 2nd edition, ed. G. Schubert, Oxford: Elsevier, vol. 2, pp. 441-472, https://doi.org/10.1016/b978-0-444-53802-4.00042-7.

194. Hirth, G., Kohlstedt, D.L. (2015) The stress dependence of olivine creep rate: Implications for extrapolation of lab data and interpretation of recrystallized grain size, *Earth Planet. Sci. Lett.* 418:20-26, https://doi.org/10.1016/j.epsl.2015.02.013.

195. Qi, C., Kohlstedt, D.L., Katz, R.F., Takei, Y. (2015) An experimental test of the viscous anisotropy hypothesis for partially molten rocks, *Proc. Natl. Acad. Sci.* 112:12616-12620, https://doi.org/10.1073/pnas.1513790112.

196. Pommier, A., Leinenweber, K., Kohlstedt, D.L., Qi, C., Garnero, E.J., Mackwell, S.J., Tyburczy, J.A. (2015) Experimental constraints on the electrical anisotropy of the lithosphere-asthenosphere system, *Nature* 522:202-206, https://doi.org/10.1038/nature14502.

197. Pec, M., Holtzman, B.K., Zimmerman, M.E., Kohlstedt, D.L. (2015) Reaction infiltration instabilities in experiments on partially molten mantle rocks, *Geology* 43:575-578, https://doi.org/10.1130/G36611.1.

198. Tasaka, M., Zimmerman, M.E., Kohlstedt, D.L. (2015) Creep behavior of Fe-bearing olivine under hydrous conditions, *J. Geophys. Res.: Solid Earth* 120:6039-6057 https://doi.org/10.1002/2015JB012096.

199. Tasaka, M., Zimmerman, M.E., Kohlstedt, D.L. (2016) Evolution of the rheological and microstructural properties of olivine aggregates during dislocation creep under hydrous

conditions, *J. Geophys. Res.: Solid Earth* 121:92-113, https://doi.org/10.1002/2015JB012134.

200. Tielke, J.A., Hansen, L.N., Tasaka, M., Meyers, C.D., Zimmerman, M.E., Kohlstedt, D.L. (2016) Observations of grain size sensitive power law creep of olivine aggregates over a large range of lattice-preferred orientation strength, *J. Geophys. Res.: Solid Earth* 121:506-516, https://doi.org/10.1002/2015JB012302.

201. Hansen, L.N., Warren, J.M., Zimmerman, M.E., Kohlstedt, D.L. (2016) Viscous anisotropy of textured olivine aggregates, Part 1: Measurement of the magnitude and evolution of anisotropy, *Earth Planet. Sci. Lett.* 445:92-103, https://doi.org/10.1016/j.epsl.2016.04.008.

202. Hansen, L.N., Conrad, C.P., Boneh, Y., Skemer, P., Warren, J.M., Kohlstedt, D.L. (2016) Viscous anisotropy of textured olivine aggregates, Part 2: Micromechanical model, *J. Geophys. Res.: Solid Earth* 121:7137-7160, https://doi.org/10.1002/2016JB013240.

203. Tielke, J.A., Zimmerman, M.E., Kohlstedt, D.L. (2016) Direct shear of olivine single crystals, *Earth Planet. Sci. Lett.* 455:140-148, https://doi.org/10.1016/j.epsl.2016.09.002.

204. Quintanilla-Terminel, A., Zimmerman, M.E., Evans, B., Kohlstedt, D.L. (2017) Microscale and nanoscale strain mapping techniques applied to creep of rocks, *Solid Earth* 8:751–765, https://doi.org/10.5194/se-8-751-2017.

205. Pec, M., Holtzman, B.K., Zimmerman, M.E., Kohlstedt, D.L. (2017) Reaction infiltration instabilities in mantle rocks: An experimental investigation, *J. Petrol.* 58:979-1004, https://doi.org/10.1093/petrology/egx043.

206. Tielke, J.A., Zimmerman, M.E., Kohlstedt, D.L. (2017) Hydrolytic weakening in olivine single crystals, *J. Geophys. Res.: Solid Earth* 122:3465-3479, https://doi/10.1002/2017jb014004.

207. Tasaka, M., Zimmerman, M.E., Kohlstedt, D.L. (2017) Rheological weakening of olivine + orthopyroxene aggregates due to phase mixing: Part 1. Mechanical data, *J. Geophys. Res.: Solid Earth* 122:7584-7596 https://doi.org/10.1002/2017JB014333.

208. Tasaka, M., Zimmerman, M.E., Kohlstedt, D.L., Stünitz, H., Heilbronner, R. (2017) Rheological weakening of olivine + orthopyroxene aggregates due to phase mixing: Part 2. Microstructural development, *J. Geophys. Res.: Solid Earth* 122:797-7612, https://doi.org/10.1002/2017jb014311.

209. Zhang, G., Mei, S., Song, M., Kohlstedt, D.L. (2017) Diffusion creep of enstatite at high pressures under hydrous conditions, *J. Geophys. Res.: Solid Earth* 122:7718-7728 https://doi.org/10.1002/2017jb014400.

210. Zhao, Y.-H., Zimmerman, M.E., Kohlstedt, D.L. (2018) Effect of iron content on the creep behavior of olivine: 2. Hydrous conditions, *Phys. Earth Planet. In.* 278:26-33, https://doi.org/10.1016/j.pepi.2017.12.002.

211. Qi, C., Hansen, L.N., Wallis, D., Holtzman, B.K., Kohlstedt, D.L. (2018) Crystallographic preferred orientation of olivine in sheared partially molten rocks: The source of the 'a-c switch', *Geochem., Geophys., Geosyst.* 19:316-336, https://doi.org/10.1002/2017GC007309.

212. Qin, T., Wentzcovitch, R.M., Umemoto, K., Hirschmann, M.M., Kohlstedt, D.L. (2018) *Ab initio* study of water speciation in forsterite: Importance of the entropic effect, *Am. Mineral.: Journal of Earth and Planetary Materials* 103:692-699 https://doi.org/10.2138/am-2018-6262.

213. Pommier, A., Kohlstedt, D.L., Hansen, L.N., Mackwell, S.J., Tasaka, M., Heidelbach, F., Leinenweber, K. (2018) Transport properties of olivine grain boundaries from electrical conductivity experiments, *Contrib. Mineral. Petrol.* 173:41 https://doi.org/10.1007/s00410-018-1468-z.

214. Wiesman, H.S., Zimmerman, M.E., Kohlstedt, D.L. (2018) Laboratory investigation of mechanisms for phase mixing in olivine + ferropericlase aggregates, *Phil. Trans. A* 376:20170417, http://dx.doi.org/10.1098/rsta.2017.0417.

215. Qi, C., Kohlstedt, D.L. (2018) Influence of compaction length on base-state melt segregation in torsionally deformed partially molten rocks, *Geochem., Geophys., Geosyst.,* 19:4400–4419, https://doi.org/10.1029/2018GC007715.

216. Wallis, D., Hansen, L.N., Tasaka, M., Kumamoto, K.M., Parsons, A.J., Lloyd, G.E., Kohlstedt, D.L., Wilkinson, A.J. (2019) The impact of water on slip system activity in olivine and the formation of bimodal crystal preferred orientations, *Earth Planet. Sci. Lett.* 508:51-61, https://doi.org/10.1016/j.epsl.2018.12.007.

217. Hansen, L.N., Thom, C.A., Kumamoto, K.M., Wallis, D., Durham, W.B., Goldsby, D.L., Breithaupt, T., Kohlstedt, D.L. (2019) Low-temperature plasticity in olivine: Grain size, strain hardening, and the strength of the lithosphere, *J.Geophys. Res.: Solid Earth* 124:5427-5249, https://doi.org/10.1029/2018JB016736.

218. Quintanilla-Terminel, A., Dillman, A.M., Pec, M., Diedrich, G., Kohlstedt, D.L. (2019) Radial melt segregation during extrusion of partially molten rocks, *Geochem., Geophys., Geosyst.* 20:2985-2996, https://doi.org/10.1029/2018GC008168.

219. Mosenfelder, J.L., Andrys, J.L., von der Handt, A., Kohlstedt, D.L., Hirschmann, M.M. (2020) Hydrogen incorporation in plagioclase, *Geochim. Cosmochim. Acta* 277:87-110 https://doi.org/10.1016/j.gca.2020.03.013.

220. Tasaka, M., Zimmerman, M.E., Kohlstedt, D.L. (2020) Rheological weakening of olivine + orthopyroxene aggregates due to phase mixing: Effects of pyroxene volume fraction, *J. Geophys. Res.: Solid Earth* 125:e2020JB019888, https://doi.org/10.1029/2020JB019888.

221. Pec, M., Holtzman, B.K., Zimmerman, M.E., Kohlstedt, D.L. (2020) Influence of lithology on reactive melt flow channelization, *Geochem., Geophys., Geosyst.* 21: e2020GC008937, https://doi.org/10.1029/2020GC008937.

222. Goddard, R.M., Hansen, L.N., Wallis, D., Stipp, M., Holyoke, III, C.W., Kumamoto, K.M., Kohlstedt, D.L. (2020) A subgrain-size piezometer calibrated for EBSD, *Geophys. Res. Lett.* 47:e2020GL090056, https://doi.org/10.1029/2020GL090056.

223. Qi, C., Zhao, Y.-H., Zimmerman, M.E., Kim, D., Kohlstedt, D.L. (2021) Evolution of microstructural properties in sheared iron-rich olivine, *J. Geophys. Res.: Solid Earth* 126:e2020JB019629, https://doi.org/10.1029/2020JB019629.

224. Meyers, C.D., Kohlstedt, D.L. (2021) Experimental measurements of anisotropic viscosity in naturally sourced dunite with a pre-existing CPO, *Tectonophys.* 815:228949, https://doi.org/10.1016/j.tecto.2021.228949.

225. Li, Y., Mackwell, S.J., Kohlstedt, D.L. (2021) Diffusion rates of hydrogen defect species associated with site-specific infrared spectral bands in natural olivine, *Earth Planet. Sci. Lett.* 581:117406, https://doi.org/10.1016/j.epsl.2022.117406.

Co-Edited Books and Journal Volumes:

1. *Orogenic Lherzolites and Mantle Processes, J. Petrology,* vol. 42, eds. M. Obata, S. Arai, J.L. Bodinier, D.L. Kohlstedt, F. Frey, M. Menzies, K. Ozawa, N. Shimizu, R. Vissers (2004).

2. *MARGINS Theoretical and Experimental Earth Science Series. Volume I: Rheology and Deformation of the Lithosphere at Continental Margins*, eds. G.D. Karner, N.W. Driscoll, B. Taylor, D.L. Kohlstedt, Columbia University Press, (2004).

3. *Diffusion, Deformation and Mineral Properties of the Earth's Interior. A Special Volume to Vonour the Scientific Contribution of Professor Olivier Jaoul* 172:1-130, eds. D. Mainprice, J. Ingrin, R. Liebermann, W. Durham, D.L. Kohlstedt (2009).