Lars N. Hansen

Department of Earth and Environmental Sciences
University of Minnesota - Twin Cities, Minneapolis, Minnesota, USA

History of Employment

Associate Professor	2019–present	Dept. Earth Sciences, U. Minnesota
Associate Professor	2013–2019	Dept. Earth Sciences, U. Oxford
Sollas Tutorial Fellow	2013–2019	University College, Oxford
Postdoctoral Scholar	2012–2013	Mantle Processes Group, Stanford U.
Visiting Scientist	Summer 2012	Lamont-Doherty Earth Observatory
Postdoctoral Scholar	Summer 2012	Rock and Mineral Physics Lab, U. Minn

Degrees Earned

Ph.D., Geophysics	2012	University of Minnesota
M.S., Geology	2007	University of Wyoming
B.S. Earth Science	2005	CalPoly, San Luis Obispo

Narrative of Research Experience

My expertise lies in the microphysics of plasticity in minerals; laboratory-based deformation experiments with gas-medium apparatus, solid-medium apparatus, and micromechanical methods; characterization of materials with electron-beam methods, especially electron-backscatter diffraction; and the mechanics of ductile shear zones in nature. I am the principal investigator for the Rock and Mineral Physics Laboratory at the University of Minnesota, at which we conduct a variety of experiments at high temperatures and high pressures, including experiments using two Paterson apparatus. Key targets for ongoing research include the role of water in the deformation of rocks and minerals, microstructural evolution as a function of strain, localization of deformation, and transient creep in the context of seismic attenuation, postseismic creep, glacial isostatic adjustment, and tidal dissipation in planetary bodies.

Key publications (denotes mentored student or postdoc)*

Wallis, D., **Hansen, L. N.**, Kumamoto, K. M.*, Thom, C. A.*, Plümper, O., Ohl, M., Durham, W. B., Goldsby, D. L., Armstrong, D. E. J., Meyers, C. D., Goddard, R.**, Warren, J. M., Breithaupt, T.**, Drury, M. R., & Wilkinson, A. J. (2020). Dislocation interactions during low-temperature plasticity of olivine strengthen the lithospheric mantle. *Earth and Planetary Science Letters*.

Hansen, L. N., David, E. C.*, Brantut, N., & Wallis, D. (2020). Insight into the microphysics of antigorite deformation from spherical nanoindentation. Philosophical Transactions of the Royal Society A, 378(2165), 20190197. https://doi.org/10.1098/rsta.2019.0197

Wallis, D., **Hansen, L. N.**, Britton, T. B., & Wilkinson, A. J. (2019). High‐angular resolution electron backscatter diffraction as a new tool for mapping lattice distortion in geological minerals. Journal of Geophysical Research: Solid Earth, 124(7), 6337-6358. https://doi.org/10.1029/2019JB017867.

L. N. Hansen., K. M. Kumamoto*, C. A. Thom*, D. Wallis, W. B. Durham, D. L. Goldsby., T. Breithaupt**, C. D. Meyers, and D. L. Kohlstedt (2019). Low‐temperature plasticity in olivine: Grain size, strain hardening, and the strength of the lithosphere. *Journal of Geophysical Research: Solid Earth*.

E. C. David*, N. Brantut, **L. N. Hansen**, I. Jackson (2019), Low-Frequency Measurements of Seismic Velocity and Attenuation in Antigorite Serpentinite, *Geophys. Res. Lett.*

D. Wallis, **L. N. Hansen**, M. Tasaka, K. M. Kumamoto, A. J. Parsons, G. E. Lloyd, D. L. Kohlstedt, A. J. Wilkinson (2019), The impact of water on slip system activity in olivine and the formation of bimodal crystallographic preferred orientations, *Earth. Planet. Sci. Lett.*

E. David*, N. Brantut, **L. N. Hansen**, T. Mitchell (2018), Absence of stress-induced anisotropy during brittle deformation in antigorite serpentinite, *J. Geophys. Res.*

A. Pommier, D. L. Kohlstedt, **L. N. Hansen**, S. J. Mackwell, M. Tasaka, F. Heidelbach, K. Leinenweber (2018), Experimental investigation of the Effect of Shear on the Electrical properties of polycrystalline olivine, *Cont. Min. Pet.*

K. M. Kumamoto, C. A. Thom, D. Wallis*, **L. N. Hansen**, D. E. J. Armstrong, J. M. Warren, D. L. Goldsby, A. J. Wilkinson (2017), Size effects resolve discrepancies in 40 years of work on low-temperature plasticity in olivine, *Science Advances*, 3, e1701338.

L. N. Hansen, C. Qi, J. M. Warren (2016), Olivine anisotropy suggests Gutenberg discontinuity is not the base of the lithosphere, *Proceedings of the National Academy of Sciences*, 113 (38), 10503–10506, doi:10.1073/pnas.1608269113.

L. N. Hansen and J. M. Warren (2015), Quantifying the effect of pyroxene on deformation of peridotite in a natural shear zone, *J. Geophys. Res.*, 120, doi:10.1002/2014JB011584.

L. N. Hansen, Y. -H. Zhao, M. E. Zimmerman, D. L. Kohlstedt (2014), Protracted fabric evolution in olivine: Implications for the relationship among strain, crystallographic fabric, and seismic anisotropy, *Earth Planet. Sci. Lett.*, 387, 157-158.

L. N. Hansen, M. E. Zimmerman, D. L. Kohlstedt (2012), Laboratory measurements of the anisotropic viscosity of olivine, *Nature*, 492, 415–418.

L. N. Hansen, M. E. Zimmerman, D. L. Kohlstedt (2011), Grain-boundary sliding in San Carlos olivine: Flow law parameters and crystallographic-preferred orientation, *J. Geophys. Res.*, 116, B08201.

Honors

Two papers in top 10% downloaded from JGR	2019
Editor's Citation for Excellence in Refereeing for JGR-Solid Earth	2018
NSF Earth Sciences Postdoctoral Fellowship (declined)	2013
AGU Mineral and Rock Physics Graduate Research Award	2013
American Geophysical Union, Outstanding Student Paper	2011
Richard Clarence Dennis Graduate Fellowship	2009–2011
Outstanding Teaching Assistant, UMN	2009
ExxonMobil Student Research Award	2008
Department of Geology and Geophysics Fellowship	2007–2008
Geological Society of America, Outstanding Student Proposal	2006
GEM Systems Magnetics Student Essay Contest Winner	2006
NASA EPSCoR Fellowship (full stipend)	2005–2007

Professional Society Memberships

American Geophysical Union
European Geosciences Union
Geological Society of America
Microbeam Analysis Society
Physical Properties of Earth Materials