Grain-boundary Sliding (GBS) in Earth's Mantle

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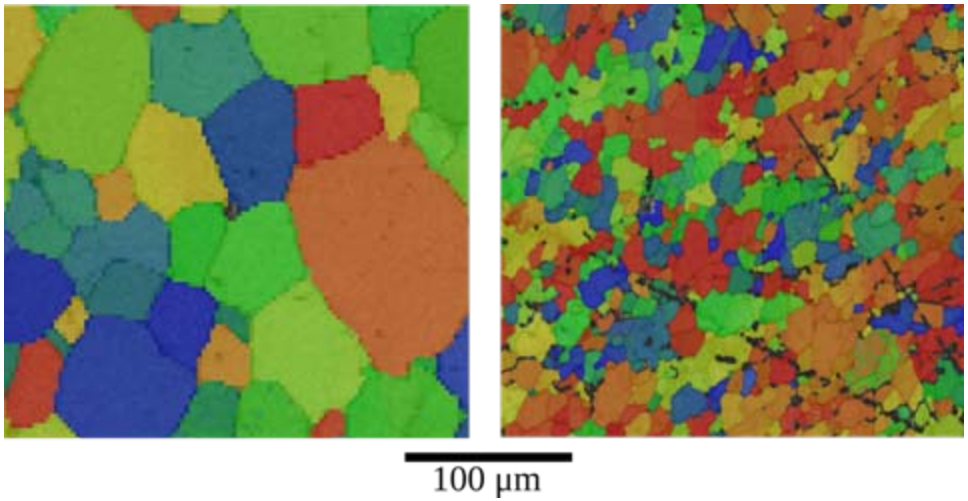
NNIN Facility utilized: Characterization Facility's JEOL6500

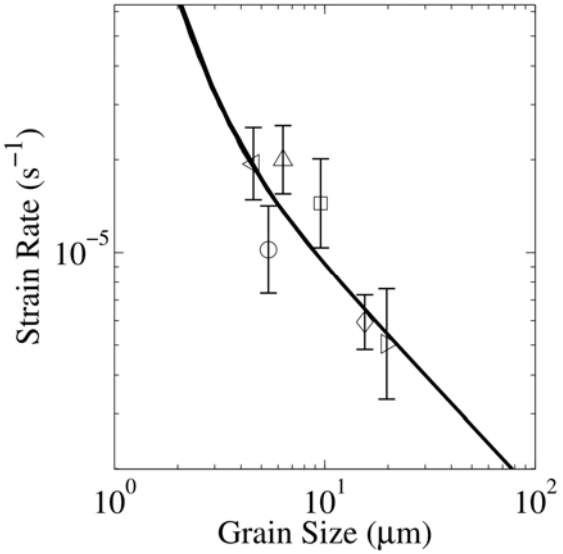
DESCRIPTION OF WORK

- Aim is to determine if GBS controls the viscosity of Earth's mantle.
- Experiments are done in lab at high P and T to develop law for scaling viscosity to Earth conditions.
- We use electron backscatter diffraction to measure grain size (see below) and texture of deformed samples.



MAJOR OBSERVATIONS

- There is a strong dependence of grain size on strain rate (see below).
- Our scaling law suggests GBS is dominant in the Earth's mantle.
- Crystallographic textures measured with EBSD match seismological observations.



Publications

- L. Hansen, M. Zimmerman, and D. Kohlstedt. "Grain-boundary sliding in San Carlos olivine: Flow law parameters and crystallographic-preferred orientation." *Journal of Geophysical Research*, in review.
- L. Hansen, M. Zimmerman, and D. Kohlstedt. "Strain localization in olivine aggregates at high temperature: A comparison of constant rate and constant stress boundary conditions." In preparation for submission to *Earth and Planetary Science Letters.*