



Effectiveness of K-B mirrors on neutron micro-focusing for single crystal diffraction studies

D. Locke (1), C. Tulk (2), J. Parise (1), G. Ice (2), J. Xu (3), R. Hemley (3), D. Mao (3), I. Swainson (4), R. Rogge (4), L. Cranswick (4)

(1) Stony Brook University, New York, USA, (2) Oak Ridge National Laboratory, Tennessee, USA, (3) Carnegie Institution of Washington, Washington D.C., USA, (4) Chalk River Laboratories, Canada

Single crystal neutron diffraction experiments with Forsterite (Mg_2SiO_4) crystals have been performed at Chalk River Laboratories, Canada to demonstrate the effectiveness of K-B (Kirkpatrick-Baez) mirrors for neutron micro-focusing. Use of the K-B mirrors produced a beam-size with a FWHM of $90 \mu\text{m} \times 89 \mu\text{m}$, a signal gain of nearly 20 times, and negligible diffracted beam divergence. White-beam Laue diffraction patterns were collected, on a MAR 345 detector at station L3, from forsterite samples as small as $300 \times 300 \times 700 \mu\text{m}$ mounted on silica glass capillaries. These patterns are sufficient for indexing and extracting crystallographic information. Additionally, preliminary in-situ high-pressure diffraction experiments with a $200 \times 500 \mu\text{m}$ single crystal of FeO in a moissanite anvil cell have been performed. Diffraction from the sample is discernible from that of the anvils. These results indicate the effectiveness of neutron focusing by K-B mirrors for diffraction studies of small single crystals either as static mounts or in-situ with high-pressure apparatus.