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Neutron diffraction in diamond anvil cells

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Neutron diffraction provides many unique advantages for structural studies of materials under extremes of pressure. In addition to the famous sensitivity to light atom positions, neutrons are sensitive to long-range magnetic order and have an extremely high spatial resolution. However, a major downside of neutron techniques, that is keenly felt in high pressure studies, is the comparative weakness of available sources. Some of these limitations have been recently overcome at the Spallation Neutron Source, ORNL, using a newly developed supported diamond-anvil device. For the first time, this new capability allows the possibility of conducting neutron diffraction measurements at pressures approaching 100 GPa. These new developments will be discussed with a look towards the prospects for advances in neutron scattering at high pressure in the near future.

Keywords: neutron diffraction, high pressure, powder crystallography