Using Neutron Diffraction to Characterize the Mechanical Properties of Rocks

P F Schofield [1], *S J Covey-Crump* [2]

1 Department of Mineralogy, Natural History Museum, London SW7 5BD, U.K.
2 School of Earth, Atmospheric and Environmental Sciences, University of Manchester, Manchester M13 9PL, U.K.

Conventional deformation experiments are generally restricted to the measurement of whole sample properties but performing such experiments *in-situ* within a neutron beam-line, makes it possible to determine how this deformation is accommodated at the grain scale within the sample. By collecting neutron diffraction patterns at different applied loads, the change in lattice parameters (and from this the elastic strain) of each mineral phase present may be monitored during the experiment. Moreover, changes in microstructural properties, such as developing textures and the progress of any mineral transformations, can be monitored. We have performed axial compression experiments on large samples using the ENGIN-X beamline at ISIS to explore the potential of this approach for characterizing the mechanical properties of geological materials. To date our experiments have been performed at temperatures up to 800 K and confining pressures up to 200 MPa exploring elastic anisotropy in rocks, changes in strain partitioning during plastic yielding and mechanical twinning.