

High pressure crystallography unlimited

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The major part of condensed matter in the Universe - deep inside planets and stars - exists under ultra-high pressures of several hundred gigapascals (GPa) and beyond. At such extreme conditions theoretical modelling predicts very unusual structures and chemical and physical properties of materials. Their synthesis and characterization at above 150 GPa have been hitherto hindered by the technical complexity of experiments involving samples' heating and by a lack of relevant methods of the composition and structure investigations. Here on examples of simple elements, hydrides, oxides, carbonates, nitrides and silicates we will discuss single crystal X-ray diffraction experiments at static pressures from about 150 GPa to over 900 GPa in a laser-heated conventional and double-stage diamond anvil cells (ds-DAC).

Keywords: High pressure; structural studies; diamond anvil cells