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Using in situ x-ray diffraction measurements to study dynamic strength in shock loaded materials HECTOR LORENZANA, JAMES HAWRELIAK, JON EGGERT, RYAN RYGG, JAMES MCNANEY, GILBERT COLLINS, LLNL, ANDREW HIGGINBOTHAM, JUSTIN WARK, University of Oxford — One of the outstanding questions in understanding the shock and high strain rate response of materials is how they plastically relax on timescales relevant to dynamic loading processes (nanoseconds), or the dynamic strength of the material. In situ x-ray diffraction can offer unique insight into material response, particularly when it is used to make measurements during high strain rate compression. Using a particular experimental geometries can allow measurements of the elastic component of strain transverse and parallel to the shock direction for grains of more than one orientation during the relaxation process. We present in situ x-ray diffraction measurements of shock compressed rolled iron foils where there is a measurable deviation from hydrostatic compression. This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

James Hawreliak
LLNL

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