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Shock and Recovery of Polytetrafluoroethylene Above and Below the Phase II To Phase III Transition ERIC N. BROWN, PHILIP J. RAE, CARL P. TRUJILLO, DANA M. DATTELBAUM, GEORGE T. GRAY III, Los Alamos National Laboratory, Los Alamos, NM 87545, USA, NEIL K. BOURNE, University of Manchester, Manchester M60 1QD, UK — Polytetrafluoroethylene (PTFE) is semi-crystalline in nature with its linear chains forming complicated temperature and pressure dependent phases. Due to its desirable mechanical properties applications of PTFE include structures designed for dynamic largescale plasticity excursions. Experimental studies on pressure-induced phase transitions using shock-loading techniques and the resulting changes in crystalline structure are presented. Disks of pedigreed PTFE 7C have been shock loaded in momentum trapped assemblies using a 80 mm gas launcher. Challenges in momentum trapping and soft recovery arising from the low yield stress of PTFE (9 MPa at room temperature) are discussed. Experiments were performed with impact pressures from 0.4 to 0.85 GPa to investigate the material response above and below the phase II to phase III crystalline transition. Changes in crystalline structure of the recovered materials were quantified using dynamic scanning calorimetry (DSC) and density.

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