Abstract Submitted
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Benzene-derived nanothreads[1] MARIA BALDINI, Carnegie Inst of Washington, XIANG LI, Pennsylvania State University, BO CHEN, Cornell University, EN-SHI XU, TAO WANG, VINCENT H. CRESPI, Pennsylvania State University, SABRI ELATRESH, ROALD HOFFMAN, Cornell University, JAMES J. MOLIASON, CHRISTOPHER A. TULK, Spallation Neutron Source , Oak Ridge National Laboratory, MALCOLM GUTHRIE, European Spallation Source, Lund, Sweden, JOHN V. BADDING, Pennsylvania State University — The benzene pressure – temperature phase diagram has been widely studied. An irreversible phase transformation to an amorphous hydrogenated carbon occurs after compressing benzene to 20 GPa [1-6]. Later synthesis of a crystalline one-dimensional sp3 carbon nanomaterial by a kinetically controlled high-pressure solid-state reaction of benzene was reported [7,8]. These benzene-derived nanothreads may be the first member of a new class of ordered sp3 nanomaterials with unique promise for a diverse range of energy applications [7,8]. We report in-situ Raman and X-ray diffraction characterization of the formation of nanothreads at high pressure. Nanothread formation begins at 14 to 20 GPa, as documented by the appearance of a new diffraction signature. The crystal-to-crystal transformation from solid benzene to nanothreads will be discussed.

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