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Synchrotron X-Ray Diffraction Probe of Pressure-Induced Phase Transition in the Nanocrystalline Phase of a Glass-Based Composite¹ KRISTINA E. LIPINSKA-KALITA, High Pressure Science and Engineering Center, University of Nevada Las Vegas, PATRICIA KALITA, Department of Physics, University of Nevada Las Vegas, RUSSELL J. HEMLEY, Geophysical Laboratory, Carnegie Institution of Washington — In situ synchrotron radiation x-ray diffraction studies were performed on a glass-ceramic nanocomposite on compression up to 43 GPa and on successive decompression. The optically transparent material contained nanometer-sized single crystalline phase homogeneously dispersed within an isotropic host matrix. The pressure-evolution of x-ray diffraction patterns was consistent with a phase transition occurring in the gallium oxide nanocrystals leading to a metastable phase. This work is the first report of a pressure-induced phase transition arising in the nanocrystalline phase of a glass-ceramic composite that involves transition form a thermodynamically stable to an unstable phase, maintained after pressure release, by the densified host glass matrix.

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