

Abstract Submitted
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High Pressure High Temperature Devitrification of Iron-Based Metallic Glass ANDREW STEMSHORN, YOGESH VOHRA, University of Alabama at Birmingham — High pressure high temperature devitrification of $\text{Fe}_{78}\text{B}_{13}\text{Si}_9$ metallic glass was studied by *in situ* energy dispersive x-ray powder diffraction measurements at HPCAT beamline 16BM-B, APS utilizing a portable Paris Edinburg cell with an integrated graphite heater. Structural changes were measured using sequential 20 second EDXD spectrums with white beam synchrotron x-ray incident radiation source. The iron-based metal glass sample along with MgO pressure standard was first pressurized and then heated at a constant rate of 2.5 K/min. Onset crystallization temperature is taken as the point where crystal peaks become apparent in the x-ray spectrum at twice the intensity of spectral noise. Heating is continued until the amorphous profile of the glass give way completely to crystalline peaks. This procedure was repeated for 0.2, 1.0, 2.0, 3.0, 4.5 and 6.0 GPa. The sample showed a marked increase in the onset of crystallization temperature with pressure, with 783 K at 0.2 GPa to 873 K at 6.0 GPa. The first phase to precipitate in each case is a bcc iron phase and other iron-boron and iron-silicon phases appeared at higher temperatures. The possibility of nucleating nanocrystalline phase was also investigated with the aim of forming a nano-composite material with enhanced mechanical properties.

Yogesh Vohra
University of Alabama at Birmingham

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