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Phase Transition Kinetics of GST at High Pressures ADAM CADIEN, QING YANG HU, HOWARD SHENG, George Mason University — The phase change material Ge2-Sb2-Te5 (GST) undergoes an amorphous to ordered phase transition in nanoseconds. This ultra-fast phase transition kinetics in conjunction with drastic electrical property changes makes GST an ideal candidate for next generation optical and digital storage media. The origins of this fast transition have thus far been traced back to the atomic configurations of both the amorphous and ordered phases. However the precise configurations of both the ordered and amorphous phases are still unknown with advances from simulations constantly altering our understanding of these structures. To discover the structural dependence of the phase transition kinetics of GST, we have performed in-situ synchrotron X-ray diffraction experiments on GST using a new Hydrothermal Diamond Anvil Cell under a range of pressures and observed new patterns of phase transition of GST at elevated temperatures. Ab initio simulations have been performed to interpret the structural evolutions of GST phases at different pressures, with an emphasis on the role of vacancies in the phase transition. Our results provide new insight into the mechanism of the fast phase transition kinetics of GST.

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