Abstract Submitted
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Fragility and super-strong character of non-stoichiometric chalcogenides: implications on melt homogenization[1] SRIRAM RAVINDREN, KAPILA GUNASEKERA, PUNIT BOOLCHAND, University of Cincinnati, MATTHIEU MICOULAUT, Université Pierre et Marie Curie — The kinetics of homogenization of binary As_xSe_{100-x} melts in the As concentration range 0%<x<50% are followed using Raman profiling, and show that 2 gm sized melts in the range 20%<x<30% take nearly two weeks to homogenize when the starting materials are reacted at 700°C. The enthalpy of relaxation at T_g - Δ H_{nr}(x) - shows a minimum in 27%<x<37% in aged samples. In such homogeneous glasses, molar volumes vary non-monotonically with composition and the fragility index m displays a broad global minimum in 20%<x<40% where m<20. The super-strong nature of melt compositions in 20%<x<30% hinders melt diffusion at high temperatures, leading to the observed slow kinetics of melt homogenization. In comparing these results with earlier reports, there is evidence that fragility decreases as melts are homogenized. Furthermore, a clear scaling of m vs. T_g is observed with a negative slope for Flexible glasses and a positive slope for Rigid and Stressed-rigid ones. The absence of a melting endotherm in non-stoichiometric As-Se compositions is reported. Fragilities of the Ge-As-Se are reported and a correlation observed with fragilities of As-Se and Ge-Se.

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