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Fragility and slow kinetics of melt homogenization in the As-Se binary[1] SRIRAM RAVINDREN, KAPILA GUNASEKERA, PUNIT BOOLCHAND, University of Cincinnati — Two gram sized As_xSe_{100-x} batches at various As content x were synthesized using pure Se and As_2Se_3 as starting materials that were reacted at 700^oC. Such melts typically took 3-12 days to homogenize, as monitored in punctuated, off-line FT-Raman line profiling[2] experiments. We have now undertaken mDSC experiments as a function of modulation frequency to establish the compositional dependence of complex $C_p(x)$, and deduce the variation of fragility m(x). We find the fragility to be rather low, $m < 20$, across the $22\% < x < 38\%$ range, and to rapidly increase at $x < 22\%$ to acquire a value of 43 near $x = 3\%$. We show that the slow melt homogenization is a direct consequence of the "strong" character of melts that serves as a bottleneck in melt-mixing at high temperatures. Once homogenized, physical properties of glasses, such as density, glass transition temperature $T_g(x)$, the Intermediate phase, and variation of enthalpy of relaxation at $T_g(x)$ differ significantly from their inhomogeneous counterparts.

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[2]S. Bhosle et al., Sol. St. Commun.151, 1851-1855 (2011)

Sriram Ravindren
University of Cincinnati

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