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Synthesis, Homogenization and Molecular Structure of Chalcogenide glasses¹ SIDDHESH BHOSLE, KAPILA GUNASEKERA, PUNIT BOOLCHAND, University of Cincinnati, PING CHEN, Boise State University — Over the years, bulk glasses have been synthesized by reacting starting materials in evacuated (10^{-5} Torr to 10^{-7} Torr) quartz tubings for various periods at suitable elevated temperatures. The lack of a non-invasive structural probe to track spatial heterogeneity of samples during synthesis has been an impediment to tune synthesis conditions, and obtain a homogeneous product. We have developed a Raman profiling technique to understand the homogenization kinetics of $\text{Ge}_x\text{Se}_{100-x}$ melts, and find dry samples (2 gram size) take 7 days of reaction at 950°C to homogenize on a scale of 50 microns, while wet ones homogenize quicker (~ 3 days), but possess physical properties measurably different from their dry counterparts. Rotating sample tubes during synthesis assists in homogenization of samples incrementally but not dramatically. A score of compositions were homogenized across the $10\% < x < 33.3\%$ range, and calorimetric, Raman scattering, and molar volume data accumulated. These data provide clear evidence for three distinct regimes of behavior as a function of Ge content, which are identified with the three elastic phases discussed earlier.²

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²P. Boolchand et al. J.Non-Cryst. Solids 293, 348 (2001).

Punit Boolchand
University of Cincinnati

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