Abstract Submitted
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Fragility, network adaptation, rigidity- and stress- transitions in homogenized binary Ge_xS_{100-x} glasses[1] SHIBALIK CHAKRABORTY, PUNIT BOOLCHAND, University of Cincinnati — Binary Ge_xS_{100-x} glasses reveal elastic and chemical phase transitions driven by network topology. With increasing Ge content x, well defined rigidity ($x_c(1)$=19.3%) and stress($x_c(2)$=24.85%) transitions and associated optical elasticity power-laws are observed in Raman scattering. Calorimetric measurements reveal a square-well like minimum with window walls that coincide with the two elastic phase transitions. Molar volumes show a trapezoidal-like minimum with edges that nearly coincide with the reversibility window. These results are signatures of the isostatically rigid nature of the elastic phase formed between the rigidity and stress transitions. Complex C_p measurements show melt fragility index, m(x) to also show a global minimum in the reversibility window, underscoring that *melt dynamics encode the elastic behavior of the glass* formed at T_g. The strong nature of melts formed in the IP has an important practical consequence; they lead to slow homogenization of non-stoichiometric batch compositions reacted at high temperatures. Homogenization of chalcogenides melts/glasses over a scale of a few microns is a *pre-requisite* to observe the intrinsic physical properties of these materials.

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