Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Elastic phases in $\mathbf{Ge}_x\mathbf{Sb}_x\mathbf{Se}_{100-2x}$ ternary glasses[1] K. GUNASEKERA, P. BOOLCHAND, University of Cincinnati, M. MICOULAUT, University of Paris VI — The rigidity and stress phase transitions in titled ternary glasses are examined in Raman scattering, modulated DSC and molar volume measurements, and found to occur at $x_c(1) = 14.9\%$ (rigidity) and $x_c(2) = 17.5\%$ (stress). Raman scattering provides evidence of the structural motifs populated in these networks. Using Size Increasing Cluster Agglomeration, Rigidity theory and the decoded structural motifs, we have calculated the rigidity and stress transitions in the first step of agglomeration to occur at $x_c(1)^t = 15.2\%$ and $x_c(2)^t = 17.5\%$ respectively, in reasonable accord with experiments. Theory predicts and experiments confirm that these transitions will coalesce if edge-sharing Ge- tetrahedral motifs were absent in the structure, a circumstance that prevails in the Ge-deficient $Ge_7Sb_xSe_{93-x}$ ternary, where a narrow IP is reported.[2] These results underscore the central role played by topology in determining the elastic phases of network glasses.

[1]Supported by NSF grant DMR 08-53957.
[2]B.J. Madhu et al. Eur. Phys. J. B 71,21 (2009).

Punit Boolchand
University of Cincinnati

Date submitted: 18 Jan 2011 Electronic form version 1.4