Raman pressure effects and internal stress in network glasses FEI WANG, S. MAMEDOV, P. BOOLCHAND, B. GOODMAN, Univ. of Cincinnati, MEERA CHANDRASEKHAR, Univ. of Missouri — Intermediate phases are predicted to be unstressed elastic phases of network glasses. The case of binary Ge\textsubscript{x}Se\textsubscript{1−x} glasses reveal the intermediate phase to reside in the 0.20 < x < 0.25 range\textsuperscript{1}. We have now performed\textsuperscript{2} Raman scattering on Ge\textsubscript{x}Se\textsubscript{1−x} glasses under pressure and find a steady increase in the frequency of modes of corner-sharing GeSe\textsubscript{4} tetrahedra when the external pressure \(P\) exceeds a threshold value \(P_c\). The threshold pressure \(P_c(x)\) decreases with \(x\) to nearly zero for 0.20 < x < 0.25, then increases up to \(x = 1/3\). \(P_c\) indicates the presence of local stress at the Raman active units; so its vanishing suggests that these units are part of an isostatically rigid backbone. Isostaticity also accounts for the non-aging behavior of glasses observed in this same composition range\textsuperscript{2} that is identified with the intermediate phase in this binary glass system.


Supported by NSF grant DMR-0456472

Fei Wang

Date submitted: 30 Nov 2004

Electronic form version 1.4