Molecular structure of virgin and $T_g$ cycled $(\text{Ag}_2\text{Se})_x (\text{AsSe})_{1-x}$ bulk glasses$^1$ JACOB WACHTMAN, PING CHEN, P. BOOCHAND, University of Cincinnati — AsSe, the base glass ($x = 0$) in the titled ternary, is an interesting example of a chalcogenide that is partially de-mixed into $\text{As}_4\text{Se}_4$ molecules segregated from a connected AsSe network, with the latter determining glass network properties. Raman scattering reveals sharp modes of the Realgar molecules that are superimposed on broad modes coming from the backbone. Upon $T_g$ cycling virgin samples (as quenched melts), the concentration of de-mixed $\text{As}_4\text{Se}_4$ molecules decreases, suggesting that thermally induced polymerization occurs; molecules break up to form part of the connective tissue. Modulated DSC experiments reveal a broad exotherm near 140 °C in virgin samples, which becomes nearly extinct in $T_g$ cycled samples. The exotherm may represent Realgar molecules nano-crystallizing as the temperature approaches $T_g$. Compositional trends in thermal parameters such as $T_g(x)$, $\Delta C_p(x)$, and the $\Delta H_{\text{nr}}(x)$ as a function of $\text{Ag}_2\text{Se}$ content $\text{‘}x\text{’}$ of the glasses will be reported.

$^1$This work was supported by NSF Grant DMR 04-56472.

Jacob Wachtman
University of Cincinnati

Date submitted: 23 Nov 2008

Electronic form version 1.4