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Evidence of Intermediate Phase in $(Na_2O)_x(GeO_2)_{1-x}$ glasses[1] V. ROMPICHARLA, PING CHEN, D. NOVITA, P. BOOLCHAND, Univ. Cincinnati, M. MICOULAUT, Univ. of Paris, W. HUFF, Univ. Cincinnati — Intermediate phases have been observed in covalent glasses, but ionically bonded network systems have received much less attention in this respect. We have now examined titled glasses in m-DSC, Raman scattering, IR reflectance and Birefringence experiments over wide range of soda concentration, $3 < x < 30\%$. Thermal experiments reveal a sharp reversibility window (RW) in the $14\% < x < 19\%$ soda range, which correlates well with a broad global maximum in molar densities (germanate anomaly) . Raman and IR reflectance TO and LO mode frequencies exhibit anomalies between $x_c(1) = 14\%$ (*stress* transition) and $x_c(2) = 19\%$ (*rigidity* transition), with optical elasticity power-laws confirming the nature of the transitions. Birefringence measurements dramatize the macroscopically stress-free nature of the Intermediate Phase (IP) in the RW. These data also suggest that the germanate anomaly can be understood as a direct consequence of the multiscale structural self-organization of glasses in the IP.

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Chad Holbrook
Univ. Cincinnati

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