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Dynamic Light Scattering in Network-Forming Oxide Melts: Ties Between Structure and Dynamics[1] TRI TRAN[2], STANLEY SCHNELL, DAVID SIDEBOTTOM, Creighton University — We report results from a series of dynamic light scattering studies of network-forming oxide glasses obtained using photon correlation spectroscopy. These studies focus specifically on how the dynamics of these viscous melts are influenced by systematic changes in the chemical structure of the oxide network and include studies of both sodium phosphate and sodium aluminophosphate melts. The fragility, a dynamical property of the liquid near the glass transition point, is determined from these measurements and seen to decrease with increases in the average density of bridging oxygen bonds regardless of the alkali content. Moreover, this dependence of the fragility on bond density is shown to be identically reproduced in both alkali borate melts and chalcogenide glasses, provided accommodations are made for the presence of structural entities in the borate system that contribute to their intermediate range order. The universal pattern that emerges suggests a significant tie between network structure and dynamics that is consistent with predictions for a rigidity transition near an average bond number of 2.4 and within the framework of a simple two-state bond model, may be traced to a common dependence of the configurational entropy on connectivity.

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