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Dynamics of Small-Molecule Glass Formers Confined in Nanopores[1] TIMOTHY PRISK, Indiana University Department of Physics, MADHUSUDAN TYAGI, NIST Center for Neutron Research, PAUL SOKOL, Indiana University Department of Physics — We report a comparative neutron scattering study of the molecular mobility and non-exponential relaxation of three structurally similar glass-forming liquids (isopropanol, propylene glycol, and glycerol) in bulk and confined in porous Vycor glass. Confinement reduces molecular mobility in all three liquids, and suppresses crystallization in isopropanol. High-resolution quasi-elastic neutron scattering spectra were fit to Fourier transformed Kohlrausch functions $\exp[-(t/\tau)^{\beta}]$, describing α-relaxation. The stretching parameter β is roughly constant with wavevector Q and temperature. Average relaxation times $\langle\tau(Q)\rangle$ are longer at lower temperatures and in confinement. They obey a power law $\langle\tau(Q)\rangle \propto Q^{-\gamma}$, where the exponent γ is modified by both temperature and confinement. Comparison of the bulk and confined liquids lends support to the idea that structural and/or dynamical heterogeneity underlies the non-exponential relaxation of glass- formers, as widely hypothesized in the literature.

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