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Ultraslow relaxation in aqueous glucose solutions near the glass transition DAVID SIDEBOTTOM, Creighton University — We report the results of both a dynamic and static light scattering study of the viscoelastic relaxation of aqueous glucose solutions. Photon correlation spectroscopy of samples with varying glucose concentration was conducted in both the polarized and depolarized scattering geometries. In addition to the usual, non-hydrodynamic, non-exponential, wavevector-independent viscoelastic (alpha) relaxation whose relaxation time approaches 100 seconds at the glass transition temperature, an even slower component of structural relaxation is observed. This ultraslow (exponential) relaxation is present only in the polarized scattering geometry and exhibits a relaxation time that varies as nearly the inverse square of the scattering wavevector. Static light scattering on these same solutions indicate the prescence of clusters with a size of order 50 nm. We speculate (1) that these clusters result from hydrogen bonding of water between glucose molecules and (2) that motion of these clusters within the fluid is the source for the ultraslow relaxation mode seen in the dynamic light scattering.

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