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Soft Glassy Rheology of Nanosacle Ionic Materials (NIMs) PRAVEEN AGARWAL, HAIBO QI, LYNDEN ARCHER — Nanoscale ionic materials (NIMs) are a recently discovered class of organic-inorganic hybrid materials which are able to relax to equilibrium in absence of any solvent. Linear rheology of these materials manifests classical traits of soft glasses, including a yield stress, slow dynamics and divergence of the viscosity. The frequency response of NIMs in the nonlinear shear regime reveals several heretofore unexplored features of soft glasses. In particular, we report that the dynamic response of NIMs at multiple, discrete strains can be superimposed to produce universal master curves spanning fifteen or more decades in time. This universal behavior, termed 'time strain superposition' (TSS), is analogous to time temperature superposition in many regards, including the fact that the shift factors obey a WLF-like relation. This feature was found to be valid in both steady and oscillatory shear rheology. We discuss these findings using Soft Glassy Rheology (SGR) model and propose that 'time strain superposition' (TSS) is a generic feature of soft glasses. Along with soft glassy rheological behavior we have also studied the thermal glass transition of in NIMs based on different corona chemistry.

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