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The rheology and microstructure of aging thermoreversible colloidal gels & attractive driven glasses[1] NORMAN WAGNER, MELISSA GORDON, CHRISTOPHER KLOXIN, Univ of Delaware — The properties of colloidal gels and glasses are known to change with age, but the particle-level mechanisms by which aging occurs is are fully understood, which limits our ability to predict macroscopic behavior in these systems. In this work, we quantitatively relate rheological aging to structural aging of a model, homogenous gel and attractive driven glass by simultaneously measuring the bulk properties and gel microstructure using rheometry and small angle neutron scattering (Rheo-SANS), respectively. Specifically, we develop a quantitative and predictive relationship between the macroscopic properties and the underlying microstructure (*i.e.*, the effective strength of attraction) of an aging colloidal gel and attractive driven glass and study it as a function of the thermal and shear history. Analysis with mode coupling theory is consistent with local particle rearrangements as the mechanism of aging, which lead to monotonically increasing interaction strengths in a continuously evolving material and strongly supports aging as a trajectory in the free energy landscape dominated by local particle relaxations. The analyses and conclusions of this study may be 1) industrially relevant to products that age on commercial timescales, such as paints and pharmaceuticals, 2) applicable to other dynamically arrested systems, such as metallic glasses, and 3) used in the design of new materials.

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