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Theory of Elasticity and Glassy Dynamics of Suspensions of Soft Particles JIAN YANG, KENNETH SCHWEIZER, University of Illinois, Urbana-Champaign — A microscopic theory for the shear modulus and slow dynamics of soft colloidal systems composed of many arm star-polymers and intra-molecularly crosslinked microgels is described. The role of particle volume fraction and softness (arm number for stars and contact modulus for microgel particles) on the ideal mode coupling kinetic arrest transition, elastic modulus, relaxation time in the activated hopping regime, diffusion constant, dynamic fragility, and absolute yield stress and strain have been systematically explored. The low-frequency shear modulus is characterized by two volume fraction regimes: power law scaling at intermediate volume fractions and a linear law beyond the nominal jamming point. Connections between single particle softeness, interparticle packing correlations, and viscoelastic properties have been established. For both microgels and many arm stars, the effective dynamical fragility varies over a wide range as a function of particle softness. Comparisons of the theoretical results with experiments on many arm star and microgel paste systems have been carried out.

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