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Linear and nonlinear rheology of dense emulsions across the glass and the jamming regimes FRANK SCHEFFOLD, CHI ZHANG, Department of Physics, University of Fribourg , THOMAS G. MASON, Department of Chemistry and Biochemistry, University of California Los Angeles — We discuss the linear and nonlinear rheology of concentrated silicone oil-in-water emulsions, amorphous disordered solids composed of repulsive and deformable soft colloidal spheres. Based on recent results from simulation and theory, we derive quantitative predictions for the dependences of the elastic shear modulus and the yield stress on the effective droplet volume fraction [1]. The remarkable agreement with experiments we observe supports the scenario that the repulsive glass and the jammed state can be clearly identified in the rheology of soft spheres at finite temperature while crossing continuously from a liquid to a highly compressed yet disordered solid. We show that the onset of elasticity due to entropic contribution can be described by a quasi-equilibrium analytical model of linear elasticity hat includes energetic contributions from entropy and soft interfacial deformation [2]. In a second set of experiments we use confocal microscopy to monitor the structure and dynamics of emulsion droplets while crossing the glass and the jamming transition. [3]. [1] F. Scheffold et al., J. Phys.: Cond. Mat. 25, 502101 (2013), [2] T. G. Mason et al., Soft Matter 10, 7109 (2014) [3] C. Zhang et al., http://arxiv.org/abs/1411.0314

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