

Switch-on of shear and creep in colloidal glass

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Suspensions of spherical thermosensitive core-shell colloids are excellent model system for the study of the fluid to glass transition. In the last years the phase behavior, the linear [1] and nonlinear [2] viscoelastic properties as well as the rheological properties in stationary flow could be described in detail with the Mode Coupling Theory (MCT). Here we report on the experimental results of the transient rheology of these suspensions in combination of MCT:

i) For the start-up of shear aging-dependent overshoot phenomena are observed experimentally. The overshoot was also found by simulations [3] and can be described by a new schematic MCT-model.

ii) A systematic investigation of the creep behavior of stresses around the yield stress will be presented. Based on fundamental rheological equations in combination with MCT, the general behavior of the creep in the different time regimes and the limiting values of these regimes can now be described theoretically [4]. Furthermore, the breaking of the glass is connected with the overshoot of the start-up of shear.

References:

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