
When liquid stops flowing: A shear thickening suspension

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Résumé

Colloidal suspensions, composed of solid particles in solvents, exhibit a wide range of rheological behaviors, particularly when concentrated. Notably, dense suspensions display shear thickening, defined by a reversible increase in viscosity with shear stress, which can hinder the mixing and flow of construction materials like cementitious pastes and mortars. At higher stress levels, these suspensions can enter a discontinuous shear thickening (DST) regime, marked by a dramatic increase in viscosity.

While a consensus on the frictional nature of the shear-thickening transition recently emerged, the current models fail to capture the steady-shear rheology at large volume fraction, suggesting the presence of heterogeneities within a shear-thickening suspension.

In this study, we employed two complementary techniques to probe heterogeneities: rheo-PIV to assess flow and rheo-SAXS to characterize microstructure evolution in fumed silica suspensions.

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