Abstract Submitted
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Multiscale modeling of the thixotropic behavior of aggregating soft colloidal particle suspensions[1] PAUL MWASAME, NORMAN WAGNER, ANTONY BERIS, University of Delaware — A multiscale model is presented that incorporates microscopic information at the soft, aggregating, colloidal particle level to a macroscopic description of a thixotropic suspension with a yield stress. This is accomplished by incorporating the relevant physics describing aggregation and breakage at the particle level into a population balance microscopic framework. A moment approach is followed to allow for model coarsening and its incorporation into a macroscopic description. Furthermore, to describe the aggregate dynamics under flow, it is necessary to include an additional description of the aggregate deformation. The yielding behavior of gel networks observed in thixotropic suspensions is modeled by adapting micromechanical models of emulsions and pastes to describe aggregate deformation under flow. A key outcome of this work is the recognition of the important role of competition between orthokinetic and perikinetic aggregation on polydispersity and dynamical behavior. Comparison to rheological experiments on a model thixotropic suspension will also be presented to validate the model developed.

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