

Abstract Submitted
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Drop impact of thixotropic yield-stress fluids¹ RANDY H EWOLDT, SAMYA SEN, ANTHONY G MORALES, University of Illinois at Urbana-Champaign — We use high-speed imaging to study the effect of thixotropy on drop impact of thixotropic-viscoplastic fluids onto thin films. Using a dimensionless group proposed earlier for predicting impact behavior of Carbopol, a glassy aqueous suspension of soft microgel particles, we predict the behavior of an aqueous suspension of Laponite, a colloidal clay with an attractive gel microstructure. For rejuvenated samples of both materials, the dimensionless group separates various impact regimes, gives a constant critical value for stick-splash transition as a function of dimensionless coating thickness, and gives a similar critical value across the varying microstructures studied. This is remarkable considering the different chemistries and microstructures involved. The group is less effective at predicting impact behavior of thixotropically aged Laponite suspensions, demonstrating the role of thixotropy in drop impact with viscoplastic fluids. We tune this dimensionless group to include thixotropic effects by proposing rheological techniques to estimate shear properties of thixotropically aged samples. The modified group is tested with a wide range of experimental conditions and is shown to be effective in predicting the drop impact regimes of aged Laponite samples.

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