Contributions of viscous dissipation in the flow behavior of soft glassy materials

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We investigate the flow behavior of dense emulsions, for which the viscosity of the dispersing medium can be conveniently varied by temperature. Our experiments denote the importance of the medium viscosity in determining the functional form of the strain rate-dependence of the stress. We thus consider that elastic, plastic, and viscous dissipation needs to be accounted for and combine the elasto-plastic model with the Bingham model to describe our flow curves. Fits obtained by using this model describe the data as accurately as the Herschel-Bulkley model, and more importantly they provide physically meaningful values. In particular, we identify a critical strain rate that describes the onset to plastic dissipation, which can be related to the critical strain that is usually determined in oscillatory shear experiments.