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Evolving Bulk Properties of Collapsing Colloidal Gels STEPHEN KAMP, MARIA KILFOIL, McGill University — We present a study of the time evolution of the elastic properties of colloidal depletion gels. Silica colloids were suspended in NaCMC solutions and homogenized. Both the colloid volume fraction and the interaction strength (polymer concentration) were varied. The time evolution of the elastic properties of the suspensions was studied with a bulk rheometer in a double-wall Couette cell throughout the gel lifetime. The early lifetime is characterized by an elastic shear modulus that increases logarithmically with time, following which the gels experience catastrophic failure and the elastic modulus drops dramatically. As the gel collapses, various complex behaviors are seen, including a temporary stabilization against collapse, and reformation of a new gel with its own elastic properties which then follows its own trajectory to collapse. Time-lapsed images were taken of identical samples in a separate transparent cell of identical dimensions and the gel height was used to calibrate the measured shear modulus values. The visual cell also allows us to see the sample-spanning collective rearrangement involved in the collapse.

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