Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Aging and nonlinear rheology of thermoreversible colloidal gels
NORMAN WAGNER, MELISSA GORDON, CHRISTOPHER KLOXIN, University of Delaware — Colloidal dispersions are found in a wide variety of consumer products such as paint, food and pharmaceuticals. We investigate gel formation and aging in a thermoreverible gel consisting of octadecyl-coated silica nanoparticles suspended in n-tetradecane. In this system, the octadecyl brush can undergo a phase change allowing the attractions between particles to be tuned by temperature (1,2). By probing the system with steady shear and large amplitude oscillatory shear, we have studied the effect of thermal history and shear history on gel formation and gel mechanical properties during aging. Gels were formed by approaching a common temperature from above and below to determine a reference state from which creep tests were conducted. Creep ringing was observed as expected for the viscoelastic gel. The rheological aging is interpreted in terms of the gel microstructure formed with differing thermal and shear histories to determine how processing affects structure. Recently proposed scaling laws for the rheology and structure under flow are explored within the context of gel aging (3). Through rheological and microstructural measurements, we will further the understanding of gel formation and aging in this model system which may be applied to processing conditions in an industrial setting. 1. Eberle, A.P.R., Wagner, N. J., Akgun, B. & Satija, S. K. Langmuir 26, 3003–3007 (2010). 2. Eberle, A.P.R., Castañeda-Priego, R., Kim, J. M. & Wagner, N. J. Langmuir 28, 1866–1878 (2012). 3. Eberle, A.P.R., et al., Physical Review E, 89, 050302 (2014).

Norman Wagner
University of Delaware

Date submitted: 01 Dec 2015 Electronic form version 1.4