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Rheological Scaling Relation for an Out-of Equilibrium Colloidal Solid[1] H. HENNING WINTER, University of Massachusetts Amherst, X. WANG, G. XUE, Nanjing University, China, P. SUN, Nankai University, China — We explore scaling relations for the slow ripening of an out-of-equilibrium model colloidal solid that consists of clay particles that swell and exfoliate into randomly oriented clay sheets through the action of end-functionalized ("sticky") polymer molecules. A freshly mixed sample quickly forms a sample-spanning network structure that gradually approaches its equilibrium. The ripening process accelerates at elevated temperature. After rescaling (Rheol Acta 45:331-338, 2006), the complex modulus data G',$G''(\omega, t_r)$ from time-resolved mechanical spectroscopy (Rheol Acta 33:385-397, 1994) shows that, surprisingly, the growth function of the elastic modulus is the inverse of the decaying characteristic relaxation time. Parameter of the isothermal ripening process is the "ripening time", t_r. A single scaling function with two pronounced powerlaw regions, a fast ripening process ($\sim \quad t_r^{-2}$) followed by slow ripening ($\sim \quad t_r^{-1/2}$), defines the state of ripening and projects the time necessary to reach equilibrium.

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