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Length scale dependent relaxation in colloidal gels EMANUELA DEL GADO, Dipartimento di Scienze Fisiche, Universita' degli Studi di Napoli "Federico II", WALTER KOB, Laboratoire des Cooloides, Verres et Nanomateriaux, Universite Montpellier II — Although gels are ubiquitous in fundamental science, technological applications and also in our daily life, their structural and dynamical properties are not well understood. In contrast to other systems that show a slow relaxation, such as glass-forming liquids, the structure of gels is given by an open network that is thought to be responsible for the unusual dynamical properties of these systems. We present the results of a recent study based on a simple model that does indeed have the characteristics of (colloidal) gel-forming systems at a finite temperature. By means of molecular dynamics computer simulations, we investigate the gel formation from the equilibrium sol phase. In particular we show that the strong length scale dependence of the dynamics in gel forming systems is tightly related to the formation of the gel structure and is therefore a general feature. This study allows for the first time to investigate on a microscopic level the relaxation processes in the incipient gel and to understand why they must strongly depend on the length scale investigated. In our model the mesh-size of the incipient gel network corresponds to a crossover length between dramatically different relaxation processes, from stretched to compressed exponentials. Moreover our results link the super-exponential relaxation at low temperature to the motion of pieces of the incipient gel structure.

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