17f The Effect of Nanoparticles on the Structure of Clay Suspensions

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Suspensions of clay particles (kaolinite) combined with silica nanospheres and salt (NaCl) undergo a dramatic stabilization process, which increases suspension viscosity as well as elasticity to the point where the suspensions can support their own mass as well as be sectioned. The suspensions develop a significant yield stress, which can be overcome by vigorous shaking, making the process completely reversible. These transitions are observed for kaolinite concentrations of 14 percent by volume (v/o), and nanosphere concentrations as small as 2 percent. SEM micrographs obtained by cryogenic fracturing of the samples indicate that the added nanoparticles produce a more ordered, ‘sponge-like' structure, possibly arising from a very localized phase separation. In some of the nanoparticle solutions, ordering of the clay platelets into dense stacks is also observed.