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Orientation Dependent Gelation of Platelet Suspensions YA-WEN CHANG, ANDRES MEJIA, ZHENGDONG CHENG[1], Artie McFerrin Department of Chemical Engineering, Texas A&M University, College Station, TX 77832 — Gelling behavior of colloidal suspensions of disk-shaped particles has long been used as an ideal system for studying the formation of arrested state of matter. High aspect ratio synthetic α-Zirconium phosphate (α–ZrP) monolayer platelets have recently received our attention as a new type of liquid crystal building blocks. We report the phase diagram of charged α-Zirconium phosphate platelet suspensions across the isotropic (I) –nematic (N) region versus salt concentrations. Typical electrostatic screening induced flocculation and gelation of platelet suspensions were observed. The morphological and rheological characteristics of liquid crystalline and colloidal gel phases were studied with polarized optical imaging and rotational/oscillatory rheometer. At high ionic strengths (>10mM), a re-entrance of fluidic liquid crystal phase occurs when particle volume fractions are above the arrested gel phase. We contribute this behavior to the competition between the driving forces for isotropic/nematic and sol/gel transitions of attractive colloidal platelets. Strong particle alignment hinders gelation, which usually demonstrates the "house of card" configuration in platelet suspensions; Isotropic suspensions flocculate and gel easily, as we confirmed experimentally.

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