

Assembly of Binary Colloidal Crystals

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Colloids are of general interest as building blocks for complex materials. Recently, it has been shown that systems of oppositely charged, colloidal particles can coexist in the same system and, by tuning system parameters, various crystal structures form that are analogous to atomic ionic crystals. These parameters include particle charge ratio, particle size ratio, screening length, and particle composition (colloidal crystals are not restricted to collections of overall charge neutral particles, as overall system neutrality is assured by counter ions in solution). Using Madelung energy calculations and Monte Carlo and molecular dynamics simulations, we investigate the phase diagrams of binary mixtures of colloids interacting via a screened Coulomb interaction (Yukawa potential) through self-assembly studies. We complement these studies with calculations of structural stability.