



# Pattern Formations and Oscillatory Phenomena: 5. Colloidal Crystals

*Junpei Yamanaka, Tohru Okuzono, Akiko Toyotama*

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Submicron-sized colloidal particles dispersed in a liquid medium self-assemble to form ordered “crystal” structures in which the particles are regularly arranged in body-centered or face-centered cubic lattice structures. Colloidal crystals have been useful models for studying crystallization in general. They have also attracted considerable attention as novel materials. In this chapter, we describe the physical basis and experimental studies of colloidal crystallization, in particular those of charged colloids. We first present a general introduction to the physical background on the stability and interaction of colloids. Then we report our studies on the crystallization of charged colloids, including charge-induced crystallization, unidirectional crystallization, gel immobilization, and exclusion of impurities. Finally, we review recent research topics in this field, including those on opal crystals and complex structures.

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