

## Heteroepitaxial growth of binary colloidal crystals

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Colloidal crystals, periodic arrays of colloidal particles, have been attracting great attention due to their unique optical properties. We have found novel growth technique of the colloidal crystals that utilizes heteroepitaxial growth; binary colloidal crystals are grown on unary colloidal crystals. Conventional epitaxial growth of the colloidal crystals is homoepitaxial growth, in which crystals with the same periodicity and spacing with a substrate grow. We have demonstrated that the heteroepitaxial growth is useful for controlling nucleation and growth of the binary colloidal crystals.

Colloidal crystallization is achieved by depletion attraction that is induced by added polymers. Large (particle A) and small particles (particle B) are mixed at various rate. A substrate is formed by convective assembly, in which single layer of colloidal crystals are formed by evaporation. We have found that the AB<sub>2</sub> structure, number ratio of large and small particles is 1:2, is formed on the substrate that compose of only particle A. In our previous research, phase A (colloidal crystals composed of A particles), phase B, and AB<sub>2</sub> phase appears depending on solution condition (solution composition and polymer concentration). When the substrate is employed, growth of AB<sub>2</sub> phase is preferred, in which formation of AB<sub>2</sub> occur at much wider solution condition than that of without a substrate. This technique is considerably useful to control nucleation and growth of binary colloidal crystals.

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