

||||| 特集：国際宇宙ステーションの応用利用 |||||
(研究紹介)

3次元フォトニック結晶 (3DPC) 生成宇宙実験における コロイド結晶成長法

山中 淳平

Method for Growing Colloidal Crystals in Three-Dimensional Photonic Crystal (3DPC) Space-Experiments

Junpei YAMANAKA

Abstract

This paper describes methodology for growing charged colloidal crystals that had been adopted in the three-dimensional photonic crystal (3DPC) space-experiments. The crystallization of charged colloids is driven by electrostatic interaction between the particles, whose magnitude is governed by experimental parameters such as the particle charge number Z , and ion concentration C . The interaction is stronger at larger Z , while it is reduced with increasing C due to the electrostatic screening effect by the ions. Z value of silica particle increases with pH. Thus, under appropriate conditions, silica colloids exhibit charge-induced crystallization by changing pH. The crystallization method used in the 3DPC space-experiments is based on the unidirectional crystal growth under gradients of Z or C . The former is enabled by diffusion of base for silica colloids. The resulting crystals consist of columnar- or cubic- crystal grains with a maximum height of a few centimeters and a maximum width of one centimeter.