Magnetic Field Effects on Crystallization in 2-Dimensional Reaction Field
２次元反応場における結晶析出に対する強磁場効果

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Since a superconducting magnet was used widely in two decades, magnetic field effects on crystallization have been studied.[1] While a metal crystal is formed from its melt, most of the molecular and ionic crystals are precipitated from its saturated solution. The driving force to crystallize is the supercooling or the supersaturation in each case. The liquid-liquid interfacial precipitation (LLIP) method is a crystallization technique from the solution. Where, two solvents, which are a good solvent saturated with the raw material and a poor solvent, are stacked to make an interface between them. The seed is crystalized and grown in the 2-dimensional supersaturated layer at vicinity of the interface due to the counter diffusion. The crystal is sunk to the bottom of a reactor according to gravity and buoyancy and then the growth reaction is finished. Magnetic field effects are expected for a morphology and polymorph of a precipitant because three magnetic forces of Lorentz force, torque and Faraday force (magnetic force) are thought to influence on a crystal by using the LLIP method.

Magnetic field effects were investigated for C60 fullerene nano-rod, glycine, taurine, lysozyme and ice as a molecular crystal, NaCl salt as an ionic crystal, *etc*.[2-5] As a result, the increases of the length and the diameter were found for C60 nano-rod under the influence of magnetic field of up to 13 T with a gradient: the volume of C60 rod crystal was enlarged by 100 times in reduced gravity environment with the aid of the high gradient magnetic field. The magnetic field effect of polymorph was studied for glycine. The yield of the unstable β-crystal was controlled by application of the magnetic field the. It was discovered that the polymorph was controlled by the high magnetic fields. The mechanism of these magnetic field effects was able to explain by the control of diffusion and convection of the solution, the virtual gravity, and the posture of growing crystal against the 2-d reaction field. The present magnetic field effects are applicable to precipitate a protein crystal and the new technique is available to a drag development.

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