

||||| 特集：国際宇宙ステーションの応用利用 |||||
(原著論文)

宇宙実験での蛋白質結晶の高品質化事前予測技術

田仲 広明¹・伊中 浩治²・古林 直樹²・佐藤 勝³・高橋 幸子¹
山中 麻里¹・広田 恵理華¹・佐野 智³・小林 智之³・田中 哲夫³

Prediction Method for Improvement of Protein Crystal Quality Grown in Microgravity

Hiroaki TANAKA¹, Koji INAKA², Naoki FURUBAYASHI², Masaru SATO³,
Sachiko TAKAHASHI¹, Mari YAMANAKA¹, Erika HIROTA¹,
Satoshi SANO³, Tomoyuki KOBAYASHI³ and Tetsuo TANAKA³

Abstract

It is said that the microgravity environment has a positive effect on protein crystallization because concentration depletion zones (CDZ) are positively formed due to minimized convection fluid motion and sedimentation. However, the microgravity experiment was thought to have a limited contribution to structural biology. In the JAXA's protein crystallization project since 2002, high viscosity of the precipitant solution had positive effects on the quality of the protein crystal grown in microgravity. Thus, we developed the method for estimating ' D/β ' for the evaluation of CDZ formation using values of the diffusion coefficient (D) and kinetic coefficient (β) by a simple experiment. The D/β indicates that CDZ is formed around the crystal in microgravity if it is low enough. Since we can predict the effects of microgravity on the protein crystal growth before performing space experiment, it is possible to select samples and crystallization conditions which have high possibility to improve the crystal quality. Moreover, if we could modify the crystallization condition to lower D/β , the improvement of the crystal quality will be expected.