Atomic Resolution Crystals Obtained in Viscous Crystallizing Condition in Space

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Alpha-amylase, a glycoprotein derived from *Aspergillus oryzae*, has been used as a technical verification protein for Japan Aerospace Exploration Agency project (JAXA-GCF). We obtained crystals of alpha-amylase which diffracted beyond 0.89Å at SPring-8 beamline BL12B2 using polyethylene glycol (PEG) 8000 as a precipitant. Furthermore, they did not form cluster-like morphology which was usually observed on the ground experiment.

From our numerical analysis, viscosity of the crystallization solution, caused by PEG, might result in growing highly-ordered protein crystals depending on depletion zone formation around a crystal especially under microgravity.

Based on this, lysozyme crystallization experiment was performed using NaCl as a precipitant in which PEG 8000 was added to increase viscosity of the crystallization solution to enhance the effects of microgravity. The crystal diffracted beyond 0.88Å at SPring-8 beamline BL12B2 was obtained.

Therefore it may be expected that viscous crystallization solution is preferable to enhance the effect of microgravity on crystal growth. Other high viscous chemicals were verified as well.

Keywords: microgravity crystal growth, viscosity, polyethylene glycol