

W0068

Viscosity of the Solution is Crucial for the Protein Crystallization to Enhance the Effects of Microgravity Environment. Hiroaki Tanaka,¹ Koji Inaka,² Shigeru Sugiyama,² Sachiko Takahashi,¹ Satoshi Sano,³ Masaru Sato³, Susumu Yoshitomi³, ¹Japan Space Utilization Promotion Center, Tokyo, 169-8624, Japan, ²Maruwa Food Industries, Inc., Nara, 639-1123, Japan, ³Japan Aerospace Exploration Agency, Ibaraki, 305-8505, Japan.

The protein and impurity depletion zones around the growing protein crystal are not disturbed so much by the reduction of convective fluid motion with microgravity environment. Therefore it is expected that the growth speed of the crystal and the impurity uptake may be suppressed in space, so that well-ordered crystal may grow.

In this study, we performed the numerical analysis of the depletion zone formation and found out that the viscosity of the solution was crucial but modifiable parameter to enhance the formation of the depletion zones. The results of the alpha-Amylase crystallization in space and on the ground were consistent with the analysis.

These results strongly suggest that microgravity effects might be enhanced by using viscous solutions as a crystallization solution. Even though the precipitant is a salt, the viscous additive might be effective.