

和文タイトル：「Gel-Tube 法の使い方 JAXA-GCF プロジェクトの技術成果より - 」

英文タイトル：How to use Gel-Tube method: the results obtained by JAXA-GCF project

Hiroaki Tanaka: Japan Space Forum (JSF)

The counter diffusion method for the protein crystallization has a preferable feature that a single capillary can continuously scan a wide range of crystallization conditions (combination of the concentrations of the precipitant and the protein) unless crystallization occurs. The original method of this has old history [1], while it was not easy to manipulate because of a free interface between the protein and the precipitant solutions. García-Ruiz et al improved the difficulty with “Gel acupuncture method” [2]. They also developed GCB (Granada Crystallization Box) [3], which provided easier operation for crystallographers.

In JAXA-GCF project, we used GCB at the beginning for the space experiment. However there were still several points to be improved. Thus JAXA developed “Gel-Tube method” [4], a much convenient new protein crystallization method of counter-diffusion mechanism based on “Gel acupuncture method”. It is composed of a single capillary, the gel in the silicon tube and the screw-top test tube, which are readily available in the laboratory.

There are several points which must be considered beforehand by the user firstly using this method. They are (1) a mechanism of counter-diffusion method for the protein crystallization and the usage of GCB, (2) the standard configuration of Gel-Tube method, (3) 1-dimensional simulations for the protein and the precipitant diffusion for the optimization of the initial condition, (4) basic principle for the initial condition setting, (5) Some tips for the solution loading, (6) Some tips for the harvesting and cryo-protecting crystals, (7) the difference from the vapor diffusion method and (8) some examples for the advanced usage.

“Gel-Tube method” is not only useful in the space experiment but also very simple and reliable in the terrestrial crystallization. It is expected to be used much in conventional crystallization.

We would like to thank Prof. J.M. García-Ruiz for their helpful advices, and also following JAXA-GCB project contributing members: Maruwa Food Industry and JAXA.

[1] Zeppezauer, M., Eklund H., Zeppezauer E. Arch. Biochem. Biophys. 126, 564 (1968).

[2] García-Ruiz, J. M., Moreno, A., Viedma, C., Coll, M. Mater. Res. Bull., 28, 541 (1993).

[3] García-Ruiz, J. M., Gonzalez-Ramirez, L. A., Gavira, J. A., Otalora, F. Acta Cryst., D58, 1638 (2002).

[4] Tanaka, H., Inaka, K., Sugiyama, S., Takahashi, S., Sano, S., Sato, M., Yoshitomi, S. J. Synchrotron Rad., 11, 45 (2004).