

Overview of Kibo experiment candidates for around 2012

1. Experiment Title

Structure Analysis of Colloidal Crystals under the Microgravity Environment by LASER Diffraction and Investigation of Colloidal Interaction

2. Principal Investigator

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3. Outline of Experiment

The Kikuchi-Kossel method of laser diffraction enables us to take diffraction images that give reliable information on crystal symmetries, and to make real-time observation of crystal growth in colloidal dispersions. Using data accumulated in ground experiments, we have built a "light-weight and automated diffraction apparatus" for the colloidal experiments in the "KIBO" space laboratory.

The main purpose of our project is, for the first time in the space laboratory, to acquire detailed information on colloidal crystals and to investigate interactions of colloidal particles, by performing precise observations on the structure of charge-stabilized aqueous colloidal dispersions with an improved apparatus. In the micro-gravity environment, we will carry out laser diffraction analysis of single- and multi-component systems of polystyrene latexes and silica and titania particles. In particular, by recording diffraction images of laser beams incident on the coordinate points on a cuvette surface, we should be able to confirm the existence of ordered and disordered phases, and to measure the decrease of the lattice constant in the ordered phase. The Solution Crystal Observation Facility will also be utilized to investigate crystallization processes in colloidal dispersions.

From these results, we aim to demonstrate "the existence of long-range attraction in colloidal interactions" in order to make a contribution to colloid chemistry and condensed matter physics. By acquiring basic information on order formation in dispersions of high density colloids, we will also explore a method for producing photonic crystals for practical use.

