

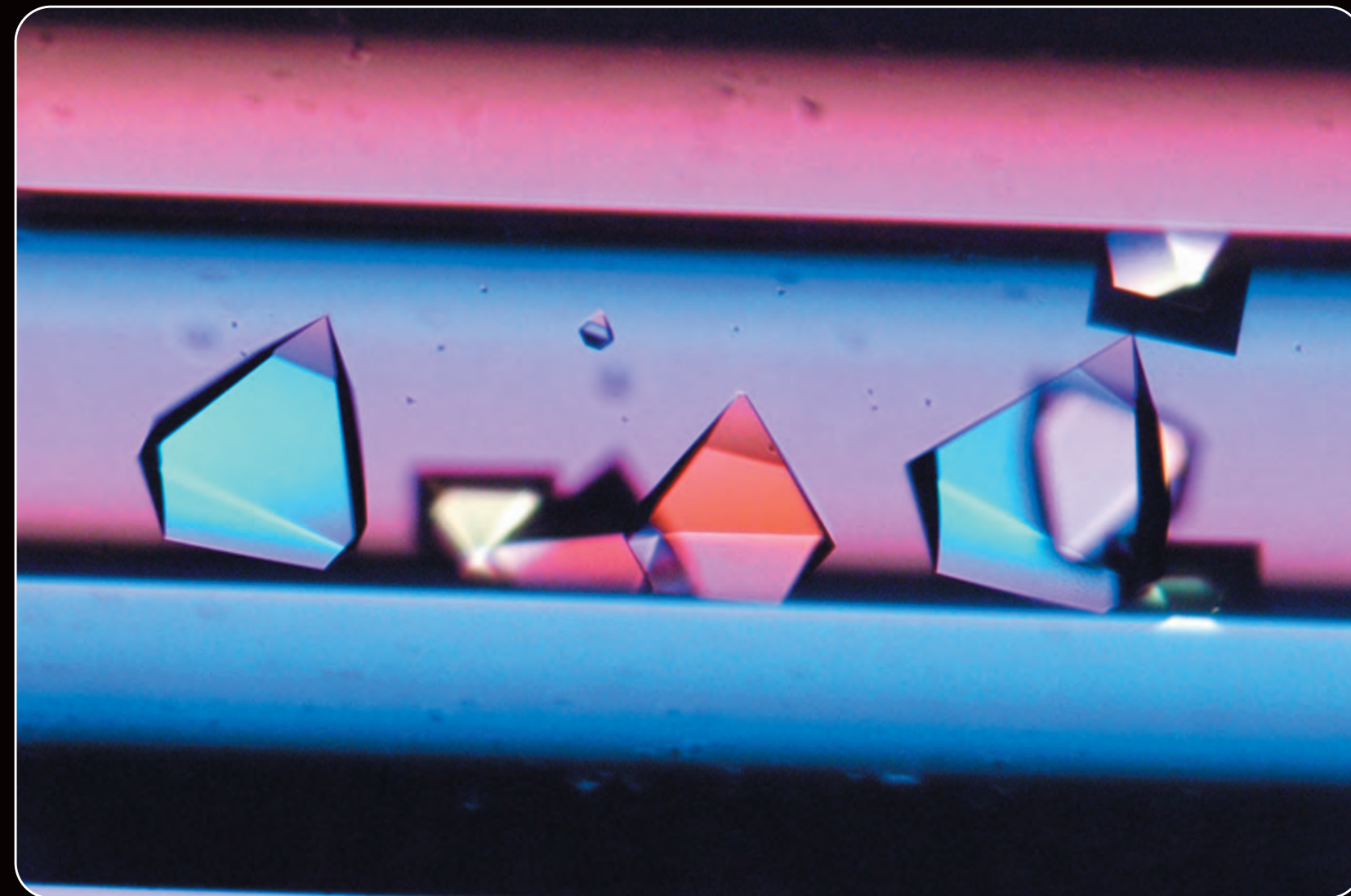
# Protein Crystal Growth in Kibo (PCG)



## Overview

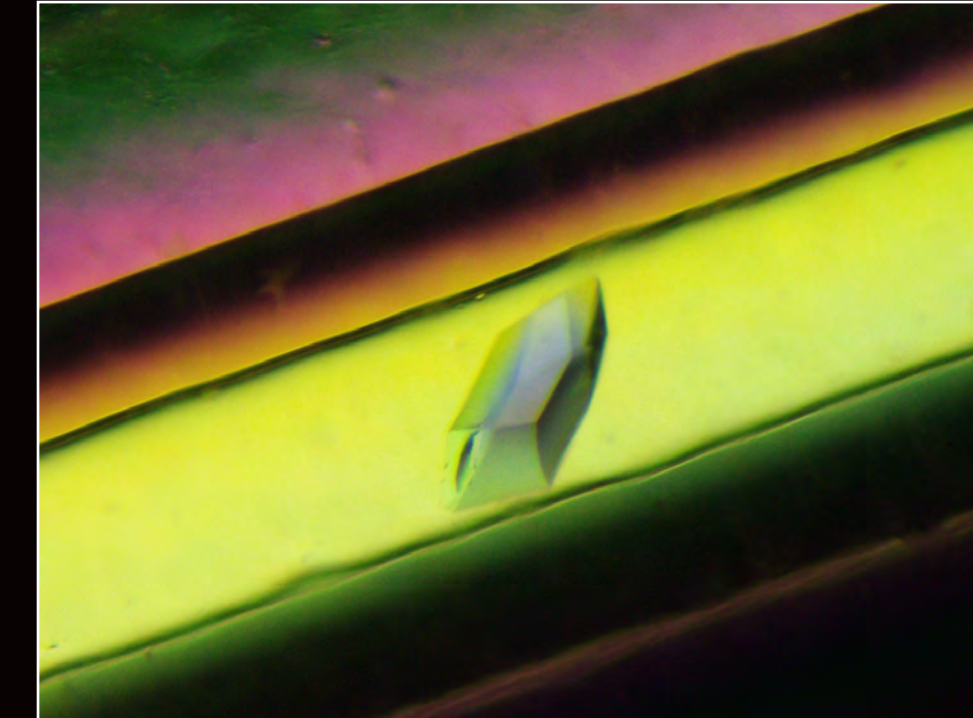
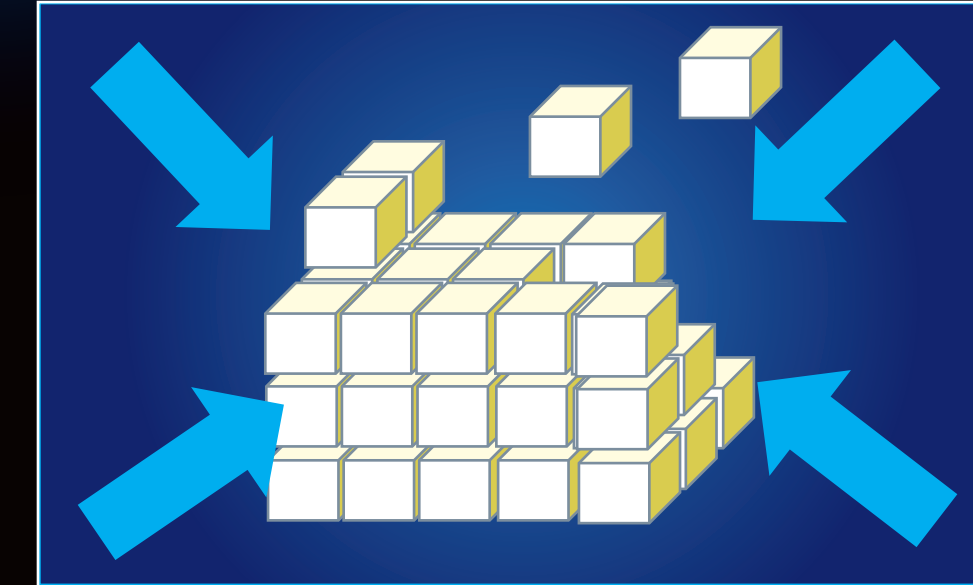
Contributing toward **Effective Drug Design, Efficient Industrial Enzyme Improvement, etc.**

- Acquiring high quality protein crystal in Kibo
- JAXA's **Hyper-Qpro Technology** support your research & development



## Advantages of Kibo

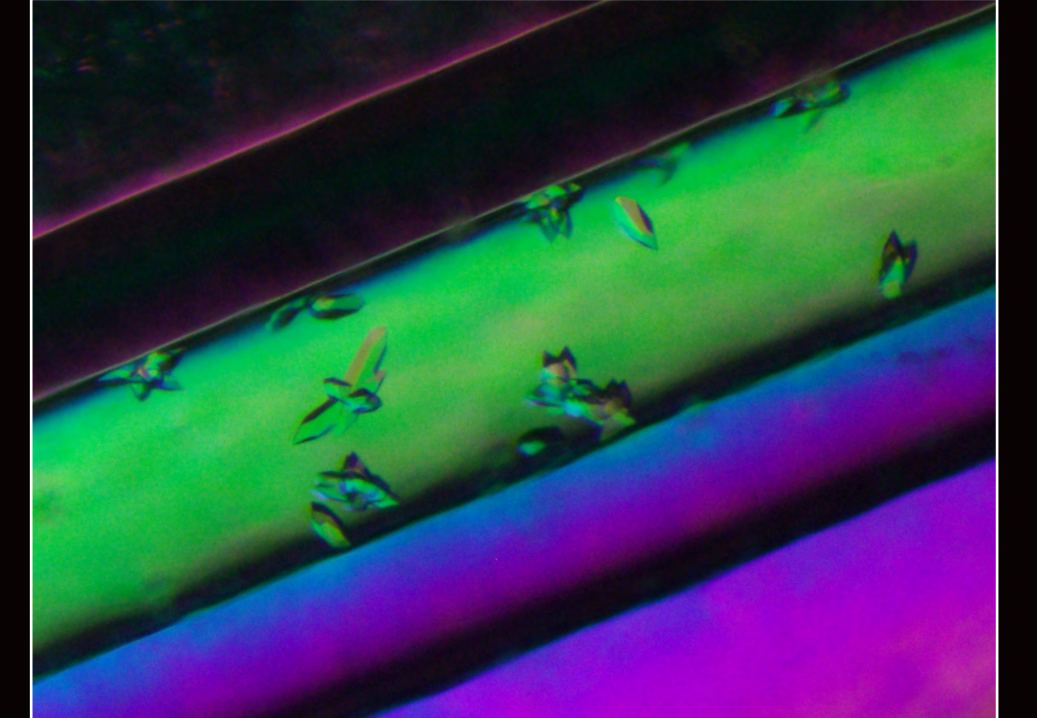
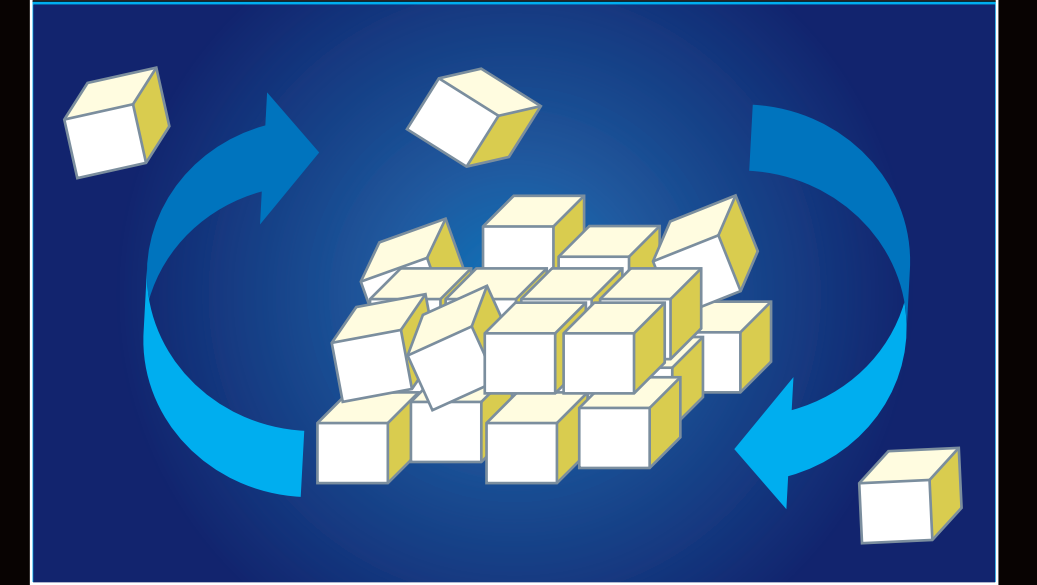
In Kibo



©Meiyo Univ./JAXA  
Space grown crystals diffracted up to 1.5Å which enabled the researchers to reveal the precise protein structure.

**Improved crystal quality** due to reduced density difference convection

On Ground



©Meiyo Univ./JAXA  
Ground grown crystals diffracted up to 2.5Å

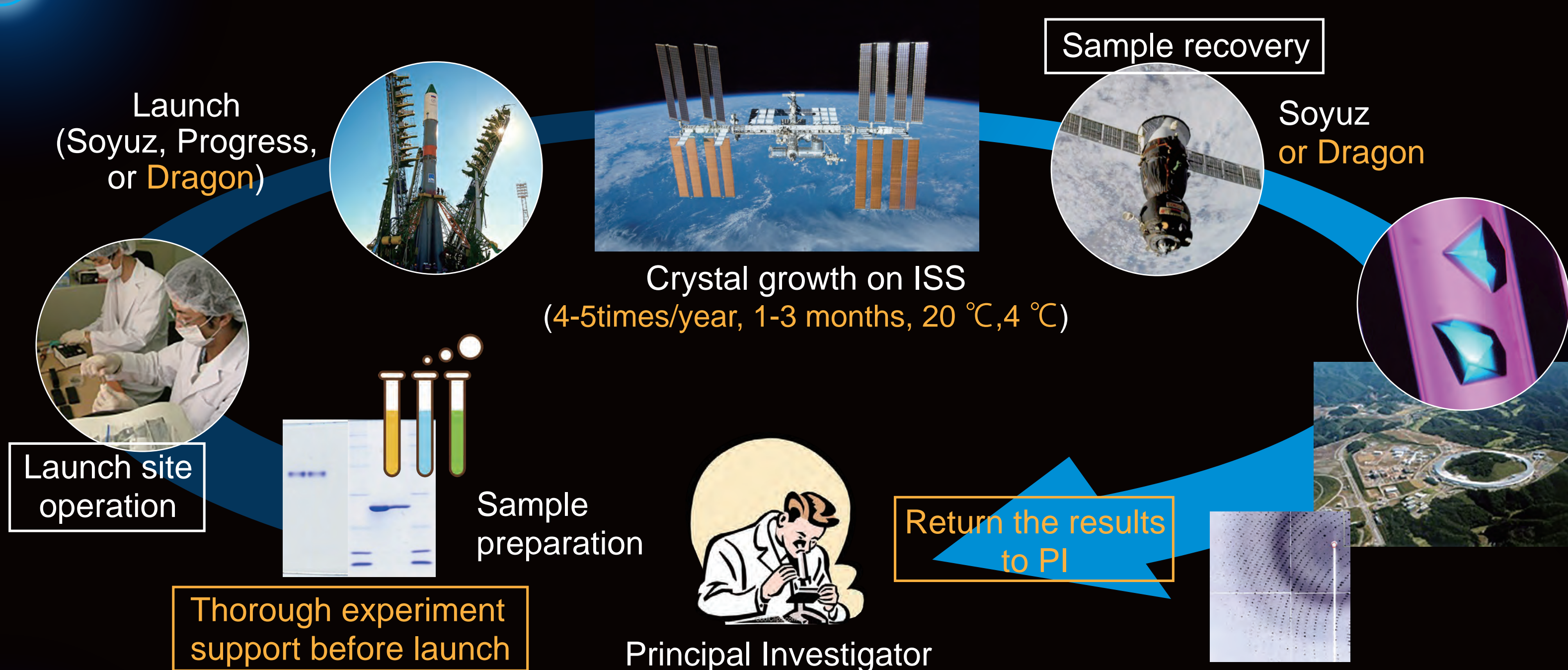
**Nonuniform molecular alignment** due to density difference convection

## Hyper-Qpro Technology

▶ Maximizing microgravity effects

▶ Maximizing Crystallization Success Rate

## Experiment Flow

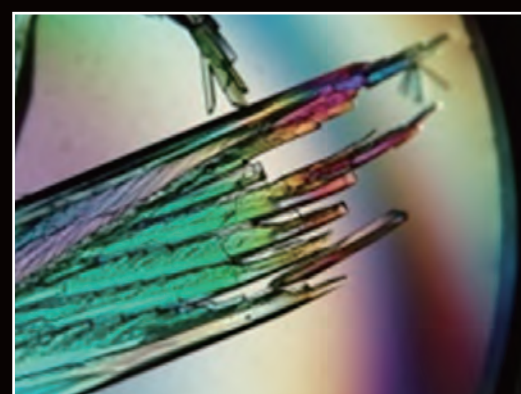


## Microgravity effects

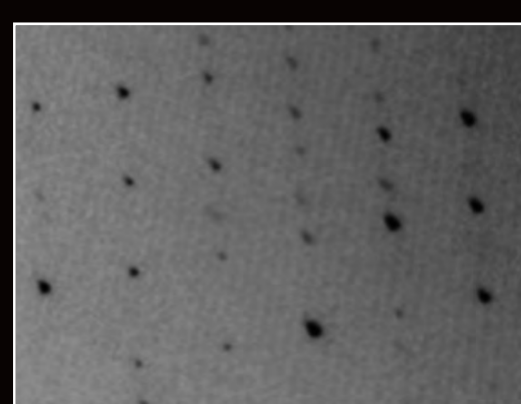
ground

space

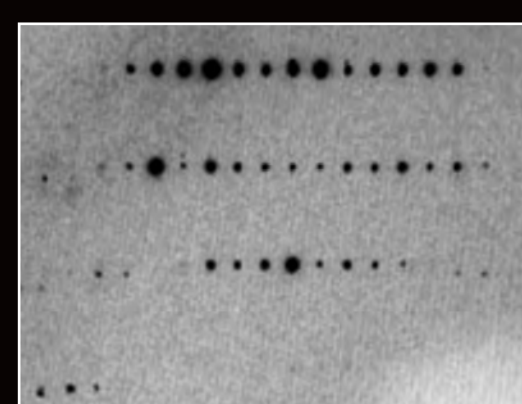
Cluster  
▶ Single crystal



Mosaicity improvement



0.523 ▶

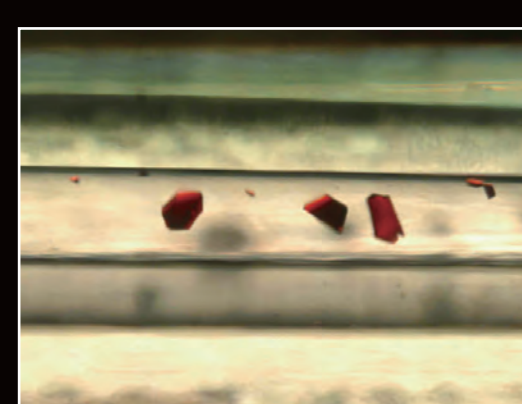


0.209

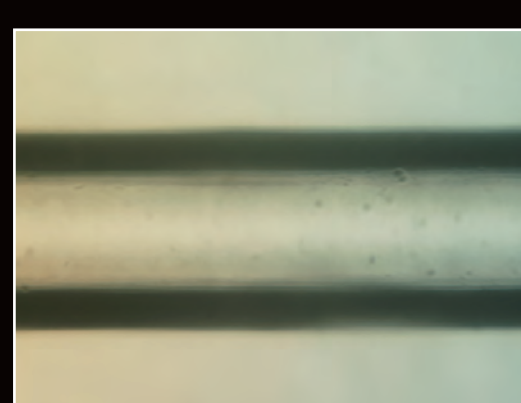
Resolution improvement



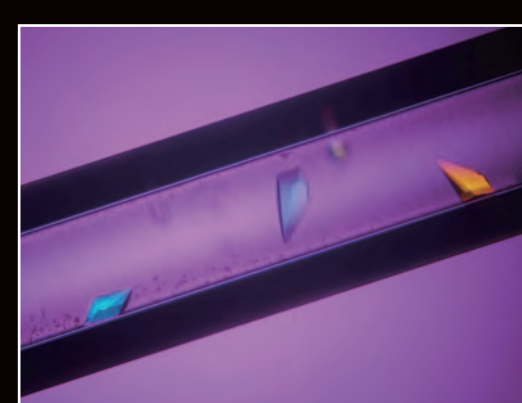
2.80Å ▶



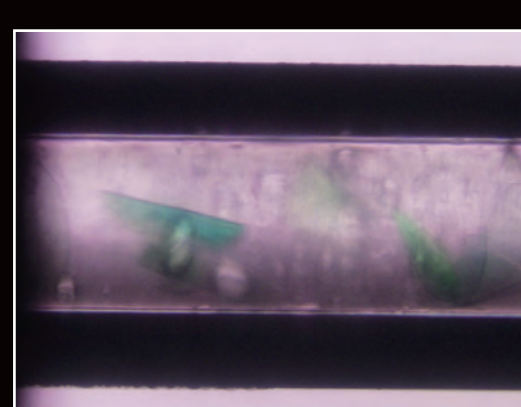
1.16Å



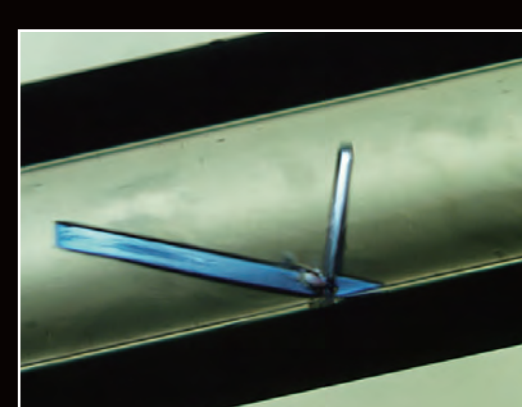
precipitant ▶



1.50Å

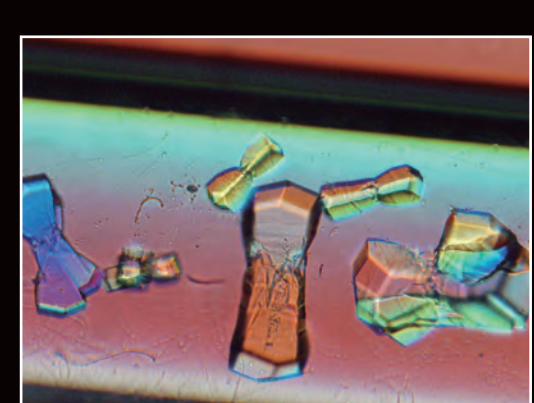


1.30Å ▶

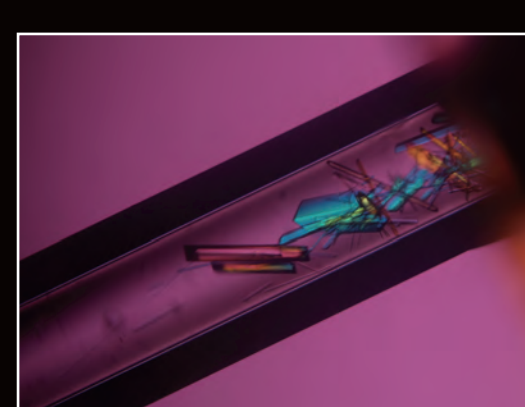


1.06Å

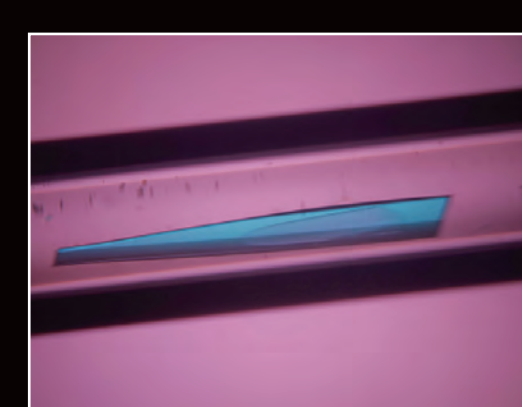
Twin crystal  
▶ Single crystal



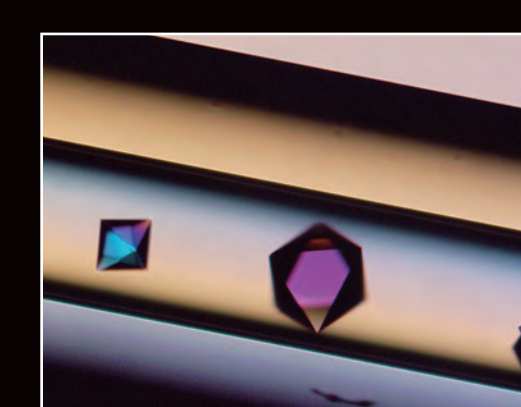
Different space group in space



P<sub>2</sub><sub>1</sub>  
65.5, 102.2, 75.4  
103.8



P<sub>2</sub><sub>1</sub>P<sub>2</sub><sub>1</sub>P<sub>2</sub><sub>1</sub>  
50.2, 66.1, 131.9



P<sub>4</sub><sub>3</sub>P<sub>2</sub><sub>1</sub>2  
67.0, 67.0, 270.0

## Thailand's first PCG space experiment onboard the ISS!

- Aiming for the development of a new antimalarial medicine -



The purpose of this experiment is to grow high quality crystals of the target enzymes using JAXA's high quality protein crystal growth technology. The crystals will be used to conduct precise structural analysis of enzymes, which are important for the development of a new antimalarial medicine. Since Malaria is a serious disease in equatorial countries that infects more than 200 million people and kills more than 400,000 people each year, the development of new medicine is necessary. The Principal Investigator is Dr. Chairat Uthaipibull of NSTDA (National Science and Technology Development Agency). The sample was launched to Kibo on SpX-18 in 2019. The research team is analyzing the returned sample in Japan and Thailand.