Poster Presentation

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Current status of protein crystal exchange robots at photon factory

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Sample exchange robots are installed at macromolecular crystallography beamlines of Photon Factory (PF), to achieve fully automated data collection in high-throughput X-ray experiments, high efficient sample exchange and/or remote-controlled experiments. In addition, an off-lined sample exchange robot is available for preparing sample cassettes before user's beam-time. PAM (PF Automated Mounter) was based on the robot SAM [1] developed by SSRL macromolecular crystallography group, but the PAM has double tongs [2] for rapid sample exchange. The PAM has been installed at beamlines BL-5A, BL-17A, AR-NW12A and AR-NE3A. We also have installed the PAM at beamline BL-1A. The BL-1A was built for low energy experiments and operated since 2010. For effective lower energy experiments, we covered whole diffractometer with a helium chamber recently. In parallel with development of the helium chamber, we developed a new sample exchange robot in order to minimize a leak of helium gas, named PAM-HC (PAM for Helium Chamber). The PAM waits while grasping a new sample and can exchange samples just after finishing diffraction experiment due to the double dongs. Therefore, the tongs exists in the liquid nitrogen Dewar during almost of the user's experiments. It is necessary to dry the tongs once per several hours to avoid freezing the tongs by frost. Currently it takes 8 minutes for drying the tongs. We are now developing a new tong-drying system using hot water instead of hot wind to reduce the time required for drying. The developed system and results of preliminary experiments will be described in this presentation. Automated liquid nitrogen filling systems are installed at above five beamlines. If a liquid level sensor breaks down, a trouble at which supplying liquid nitrogen does not stop is expected. Safety measures of the filling system also will be presented.

[1] Cohen, A. E. et al. (2002). J. Applied Crystallography, 35, 720-726.
[2] Hiraki, M. et al. (2008). J. Synchrotron Radiation, 15, 300-303.

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