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Desktop Minstrel UV™: A Novel Protein Crystal Monitoring Automation System Using UV Fluorescence Microscopy. Jian Xu, Craig Sterling, Michael Willis, Rigaku Automation, 5999 Avenida Encinas, Suite 150, Carlsbad, CA 92008.

Identifying protein crystals in crystallization droplets has long been considered a challenging step in the field of protein crystallography. Although there are numerous automated crystallization robots readily available, none have been able to successfully monitor crystal growth by distinguishing protein crystals from non-protein crystals and detecting crystals from drops that are otherwise difficult to see with visible light. In order to fulfill this critical need, Rigaku has developed a novel protein crystal monitoring automation system, the Desktop Minstrel UV™, which uses UV fluorescence microscopy. The system includes an ultraviolet microscope with at least one ultraviolet light emitting diode, providing illumination with the wavelength matching the absorption of the fluorescing amino acids, such as tryptophan. To greatly decrease photo-damage to the protein crystals, the fluorescing light illuminated on the sample is reduced to the minimum and is then digitally recorded by a camera with a CCD sensor. We have conducted crystallization experiments with various proteins in order to evaluate this system. The resulting UV images from these experiments clearly reveal the protein crystals from non-protein crystals, such as salts. In addition, this UV crystal monitoring system is built upon the platform of Rigaku's state-of-art imaging automation technology, the Desktop Minstrel™, which makes the evaluation of a large number of crystallization experiments possible. The Desktop Minstrel UV enables researchers to accurately harvest protein crystals for data collection or design follow-up experiments.