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**Automated Liquid Dispensing with Precision and Accuracy for Protein Crystallization Using the Alchemist™ II.** Jian Xu, Matt Lundy, Michael Willis, Rigaku Automation, 5999 Avenida Encinas, Suite 150, Carlsbad, CA 92008.

Crystallization of macromolecules requires chemical stock solutions of diverse physical and chemical properties, such as viscosity, volatility, and ionic strength, to be dispensed consistently in various volume ranges. The Alchemist II, a robotic liquid handling system from Rigaku, offers a solution that automates the tedious and time-consuming process of producing liquid formulations, enabling crystallographers to quickly and reliably screen a broader selection of conditions. The applications of positive pressure displacement pipetting and the unique Tapper technology make it capable of dispensing a wide range of volumes (1 $\mu$ L to 10mL) and liquid types, including viscous, aqueous and volatile solutions, with precision and accuracy. The patent pending BirdFeeder™ technology eliminates the usage of tubing and tips and provides an automated pipetting solution without cross contamination. We report here an achievement of high liquid dispensing precision and pH consistency from studies conducted on representative chemical stock solutions showing, for instance, an average coefficient of variation (CV) of less than 2% dispensing 50% PEG 8K with volumes ranging between 1 $\mu$ l and 10 $\mu$ l and an average CV of less than 0.2% with pH values ranging between pH7.0 and pH9.0 using Tris hydrochloride as a buffer system. An example of successful crystallization of HSP90 protein using Alchemist II as a screen making system will also be illustrated.

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