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A Biological Small-Angle Scattering Facility with a Built-in USAXS Setup. H. Tsuruta, I. Smolsky, K. Ito, P. Liu, SSRL/SLAC, Stanford University.

Beam Line 4-2 is a small angle x-ray scattering/diffraction facility for structural studies on mostly non-crystalline biological systems. We have recently upgraded this facility to take full advantage of the high brightness beam produced by the new third generation storage ring SPEAR3. The instrument consists of a pin-hole geometry camera, which covers the Q range 0.006 - 1.25 $Å^{-1}$, and a Bonse-Hart geometry USAXS setup composed of a pair of channel-cut collimator/analyzer crystals, which are translated in and out within the vacuum flight path of the pin-hole camera. The instrument allows quick automated distance and detector selection among any combination of 5 distances and 3 types of position sensitive detectors without the need for lengthy sample alignment. The use of the collimator crystal alone results in modest improvement in small angle resolution. We have developed several sample handling devices, including stopped-flow rapid mixers, for initiating conformational changes for time-resolved studies in the millisecond to minute scale. An in-vacuum solution cell is also available. We are in a process of adopting the Blu-ICE/DCS software, developed originally for macromolecular crystallography, for integrated beam line control and static small angle scattering data collection.

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