NEXT GENERATION X-RAY DETECTOR FOR IN-HOUSE XRD

TAGUCHI Takeyoshi[1], Christian BROENNIMANN[2] and Eric F. EIKENBERRY[2]
[1]Rigaku Corporation, 3-9-12 Matsubara-cho, Akishima-shi, Tokyo 196-8666, Japan
[2]DECTRIS Ltd., 5232 Villigen PSI, Switzerland

A novel type X-ray detector, called PILATUS, has been developed at the Paul Scherrer Institut (PSI) during the last decade. PILATUS detectors are two-dimensional hybrid pixel array detectors, which operate in single-photon counting mode. The PILATUS detectors have a very wide dynamic range (1:1,000,000), very short read out time (< 3.0msec), and very high counting rate (> 2 x 10^6 counts/sec/pixel). Additionally, the PILATUS detector can set energy threshold individually for each pixel. Thus the PILATUS can suppress fluorescence background. These features are superior to existing area detectors and PILATUS is the next generation X-ray detector.

The PILATUS detector systems have a few different configurations. A single module of PILATUS detector, or the PILATUS 100K, has 487 x 195 pixels with a pixel size of 172 x 172μ^2. The active area is 83.8 x 33.5mm^2. Large area systems consist of 20 to 60 modules and can cover up to 424 x 435mm^2 area. Such systems are mainly used for macromolecule analysis, i.e. protein crystallography. The single module detector is small and easy to handle and can be adapted to many systems with small modification. The PILATUS 100K detector is integrated to an in-house X-ray diffraction system and demonstrates superior performance. Some examples of XRD measurements with the PILATUS 100K detector will be given.