USE OF 2D X-RAY DETECTOR IN POWDER DIFFRACTION MEASUREMENT

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It has become widely recognized that the synchrotron radiation and position sensitive detectors are powerful tools for powder diffraction studies. One may wonder which is the better choice of position sensitive detectors, one-dimensional or two-dimensional. As the format of conventional powder diffraction data is one-dimensional, the choice of a one-dimensional detectors may look suitable. In this study, the authors would like to demonstrate the advantage of the combined use of synchrotron X-ray and two-dimensional detectors in powder diffraction measurements.

When the powder diffraction data are recorded with a two-dimensional detector, the requirements about the size of memory area and the computing time for analysis clearly becomes pronounced. But the recent advancement of computing technology helps us analyzing and extracting information from the data. We have drawn a bird's eye view of the surface plot about the diffraction intensities from $BaTiO_3$ at 150 K, recorded with a two-dimensional semiconductor X-ray detector (Dectris PILATUS100K). It has been found that the apparent corrugation along the Debye-Scherrer [1] or Hull[2] rings is artificially caused probably by quantization error of the pixel detector, because similar corrugation is seen in the simulation calculated with a simple mathematical formula that does not explicitly include a vibrating term.

[1] P. Debye and P. Scherrer, *Physikalische Zeitschrift* **17**, 277–283 (1916).
[2] A. W. Hull, *Phys. Rev.* **10**, 661–697 (1917).