

## Improvements of Grating-based X-ray Phase Contrast Imaging with a Microfocus X-ray Source by a SOI Pixel Detector, SOPHIAS

*Sunday, 10 December 2017 21:21 (1 minute)*

X-ray absorption radiography with a microfocus x-ray source plays an important role in a variety of fields, including industrial application, materials science, and biology, because it enables nondestructive observation of the inside of materials in high spatial resolution. Recently x-ray phase-contrast imaging (XPCI) and small-angle scattering (SAS) imaging have been demonstrated using several techniques to enhance the contrast of light element materials. Among them, the method utilizing a single-amplitude grating is very attractive, because we can freely set optical parameters such as source-grating and grating-detector distances independent of x-ray energy.

In this paper, we demonstrate two improvements of this method utilizing the advantages of a silicon-on-insulator (SOI) pixel detector, SOPHIAS[1]. The detector enables to estimate the energy and incident position of individual x-ray photons. One is single-exposure energy-resolved XPCI, and the other is the improvement in spatial resolution of SAS imaging. In the XPCI, absorption and phase-contrast images of polymethyl methacrylate (PMMA) and Si spheres were obtained for 8- and 15-keV x-rays from single-exposure data, which is very useful in material characterization. Analyzing electric charge generated by x-ray photon irradiation near pixel boundary improved spatial resolution of SAS images in addition to the enhancement of signal-to-noise ratio of XPCI.

[1] T. Hatsui et.al., Proceedings of International Image Sensor Workshop, Article 3.05 (2013).

**Primary author:** HOSONO, Ryo (Osaka University)

**Co-authors:** Mr TSUKAMOTO, Daisuke (Osaka University); Mr KAWABATA, Tomoki (Osaka University); Dr HAYASHIDA, Kiyoshi (Osaka University); Dr KUDO, Togo (JASRI & RIKEN); Mr OZAKI, Kyosuke (RIKEN); Dr HATUSI, Takaki (RIKEN); Prof. TERANISHI, Nobukazu (University of Hyogo); Dr HOSOI, Takuji (Osaka University); Prof. WATANABE, Heiji (Osaka University); Dr SHIMURA, Takayoshi (Osaka University)

**Presenter:** HOSONO, Ryo (Osaka University)

**Session Classification:** POSTER

**Track Classification:** SOI detectors