Poster Presentation

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A quick laboratory X-ray reflectometer for time-resolved observations

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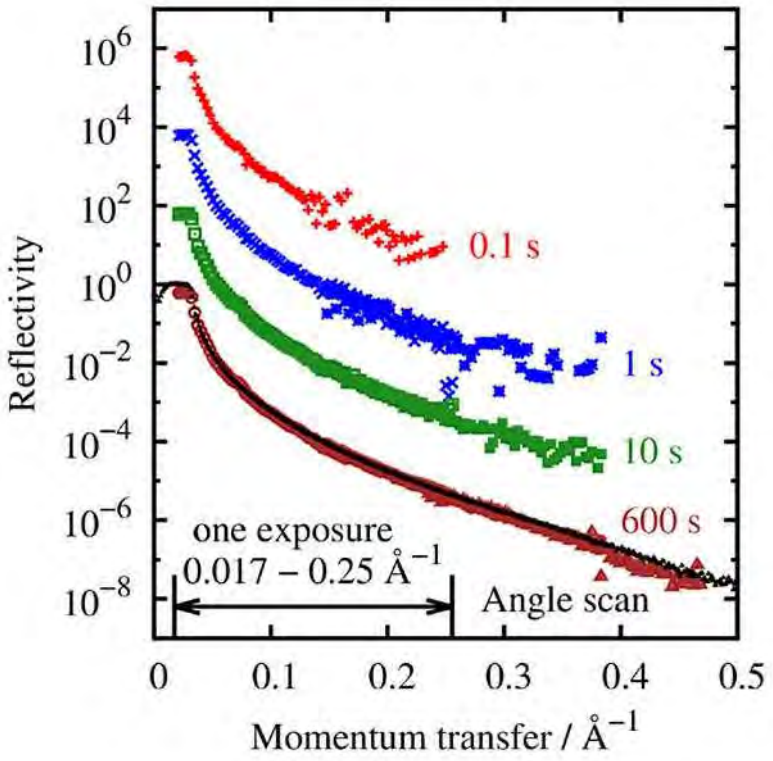
The measurement of the X-ray reflectivity curve is a widely used method to obtain structural information about thin films, surfaces and interfaces. With conventional instruments, the reflectivity curve is measured sequentially for a range of incident angles, which takes a long time. A recently developed method using white synchrotron radiation can measure the whole curve at once [1, 2]. In this contribution, the adaption of this method to a laboratory characteristic X-ray source is presented. This will make it possible to do time-resolved or high-throughput measurements using standard laboratory sources. The basic idea of our method is to focus the divergent X-ray beam emitted from a point source with either a doubly-curved Si crystal monochromator or a bent-twisted Si crystal monochromator [1]. Instead of using the whole beam, however, only the fan-shaped beam from a diagonal line on the monochromator is focused onto the sample. This is realized by placing an inclined slit before the monochoromator. The beam reflected from the sample forms a line on a two-dimensional pixel array detector. For each horizontal position on the detector, the incident angle onto the sample, and therefore the momentum transfer, is different. The reflectivity curve for a range of momentum transfers can therefore be measured with a single detector exposure without moving the sample, monochromator or detector. Reflectivity curves from a silicon wafer sample measured by our method are compared with the conventional angle scan method in the figure. The reflectivity down to 10 to the -7th power can be obtained, because the background can be subtracted from the measured intensity. We will show an example of time-resolved (10 s) measurements of specular X-ray reflectivity curves. We will also discuss the momentum transfer range that can be measured simultaneously and factors limiting the resolution of the method.

[1] *T. Matsushita, E. Arakawa, W. Voegeli, et al., J.Synchrotron Rad., 2013, 20, 80-88,* ***[2]*** *E. Arakawa, W. Voegeli, T. Matsushita, et al., Journal of Physics: Conference Series (JPCS), 2013, 425, 092002-092006*



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