15A/2007G520

A apparatus for the simultaneous determination of the X-ray absorption factor especially for offset-setting during SAXS measurement

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Introduction

Small-angle X-ray scattering (SAXS) measurement is good method to obtain information on the structure analysis. In the background correction of the measurement, it is the most important to measure absorption factor, μt, because the net scattering intensity from the sample exponentially depend on the absorption factor. Therefore we has been developed a novel apparatus that enables the simultaneous determination of the absorption factor during measurement of SAXS intensity.[1)]

Also the SAXS profile is important to calculate the SAXS intensity at scattering angle of zero as well as for structure investigation. To calculate the intensity strictly, SAXS profile had better be measured to smaller angle. For structure investigation, SAXS profile had better be measured to larger angle because it is effective to do Fourier-transform. That is to say SAXS profile had better be measured more widely. Recently, incidence beam size of BL-15A changed to small. So, we had developed the apparatus into smaller and the shape that enables measurement wide range—by offset-setting—.

Experimental

Simultaneous measurement of the SAXS with using the novel constructed apparatus was carried out for pure water. Figure 1 shows the apparatus set in BL-15A. The apparatus is composed of a photodiode implanted in a direct beamstop. Size of the photodiode is 4.2×5.0 mm^2 with a thickness of 1.8 mm in the plastic package. The photodiode is covered with aluminum foil to shade visible light.

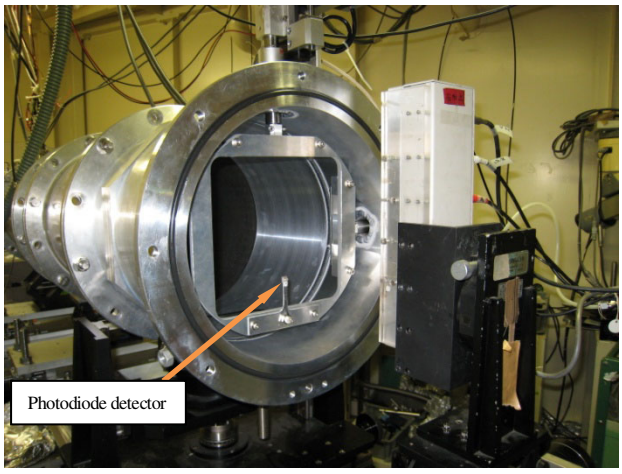

Fig.1. apparatus in the vacuum chamber

Results and discussion

Figure 2 shows the SAXS intensity of pure water. It is obtained remarkable result that the very widely observable *s*-region and flat through the all region. Former the observable *s*-region was in the range from 0.02 to 0.19 $Å^{-1}$, but the present observable *s*-region was in the range from 0.017 to 0.28 $Å^{-1}$. It is powerful apparatus in the SAXS measurement because not only the observable *s*-region is wide but also the SAXS intensity of pure water can measure to flat in a wide range.

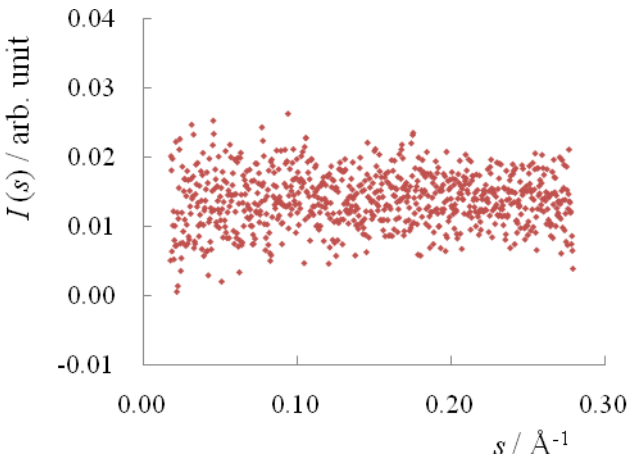

Fig.2. SAXS intensity of pure water

Reference

1). T. Morita, Y. Tanaka, K. Ito, Y. Takahashi and K. Nishikawa, *J. Appl. Cryst.* (2007). **40**, 791-795.

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