Study on X-Ray Phase Imaging Microscope with a Lau Interferometer Having a π Phase Grating

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X-ray phase imaging has been developed to overcome the problem of the weak absorption contrast because the interaction factor of the phase shift is much larger than that of absorption particularly for low-Z materials. X-ray phase imaging based on grating interferometry has been attracting attention because of its flexibility. It should be highlighted that grating interferometry is compatible with X-ray microscopy. The spatial resolution of X-ray phase imaging with an X-ray grating interferometer is normally limited by the period of the gratings used to construct the interferometer. However, by combining it with an X-ray imaging microscope, it is possible to overcome the spatial resolution limit. The demonstrations of this combination were reported by using synchrotron radiation [1]. Recently, we have developed a laboratory-based type, where a grating interferometer (Lau interferometer [2]), a Fresnel zone plate (FZP), and an X-ray rotating anode tube were combined [3]. The development is based on a ZEISS Xradia 800 Ultra nano CT X-ray microscope having a FZP as a microscope objective, which is operated for Cu Kα characteristic X-rays, as shown in Fig. 1.

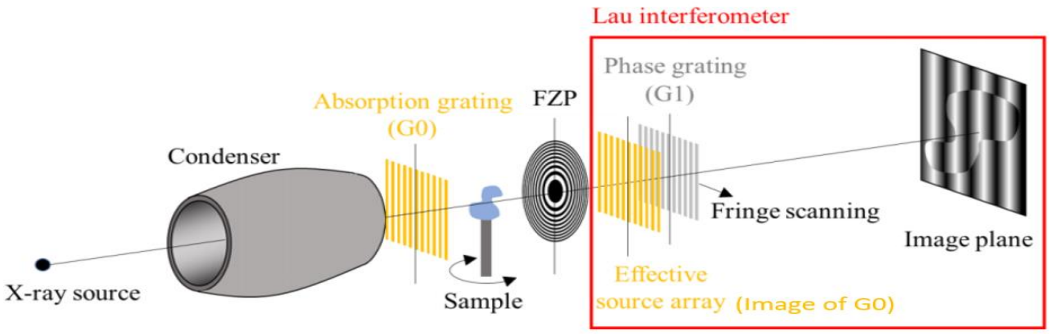

Figure 1. Optical configuration of the x-ray phase microscope in combination with a Lau interferometer

In this system, through the normal fringe-scanning measurement [2], a twin phase image, which has an overlap of two phase images of opposite contrast with a shear distance much larger than the system resolution, is generated. Recently, we studied the difference in the effect of the phase grating (G1) between π and π/2-shift type. The effect of selecting a shorter period to enlarge the shear distance was also studied. More details will be discussed in the presentation.

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Reference

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