

# Tomographic Micro-Imaging of Buried Layers and Interfaces with 15W X-ray Power

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Designing and controlling buried layers and interfaces have been crucial in catalysis, microelectronics, lubrication, photography and many environmental processes[1]. To evaluate and characterize the buried interface, advanced X-ray techniques are promising because of their capability to see the atomic to nano-scale structures along the depth in a non-destructive way[2]. Though conventional X-ray reflectivity does not own the spatial resolution, introducing X-ray reflection tomography is helpful[3]. In the present research, we have developed a new instrument to visualize the buried layers and interfaces with high resolution, by using a micro focus 15W X-ray power source. Figure 1 shows the arrangement of this new X-ray reflection tomography setup.  $\beta$ -filtered X-ray from the micro focus X-ray source hit the sample at an incident angle  $\theta$  and then form a magnified projection of the sample on an image plate. The sample is rotated at specific step along the  $\phi$ -axis to have different projections. All projections are used for mathematical image reconstruction. The spatial resolution is limited by the size of X-ray source, 50 $\mu$ m.

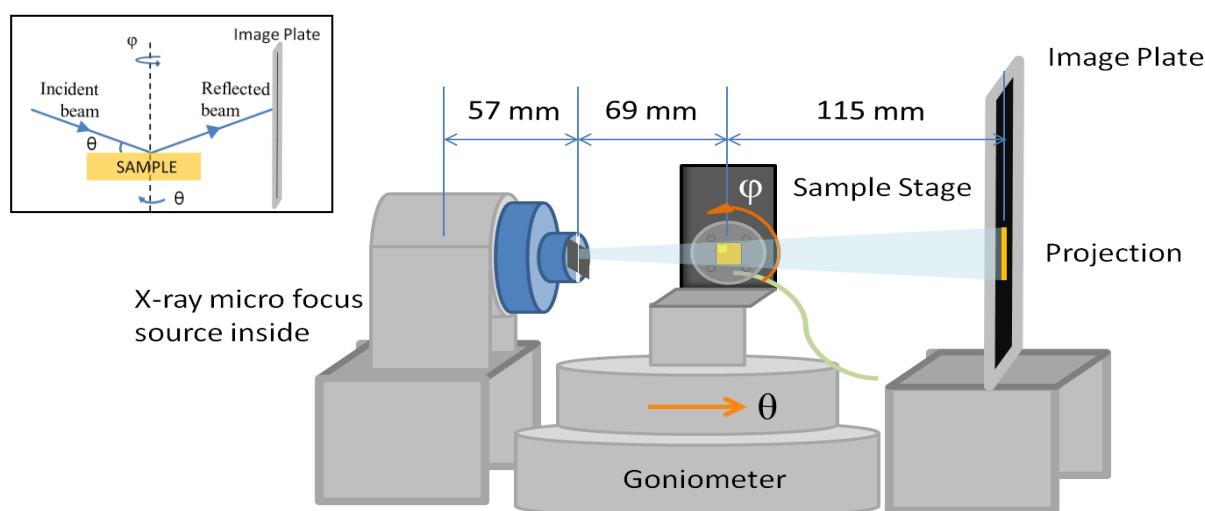


Figure 1 X-ray reflection tomography instrument using a micro focus 15W X-ray power source. Inset shows the geometry of the sample stage. Sample is rotated along the  $\phi$ -axis to have different reflectivity projections which are recorded on an image plate placed 115 mm away.

## References:

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- [3] V. A. Innis-Samson, M. Mizusawa, and K. Sakurai, "X-ray reflection tomography: a new tool for surface imaging.," *Anal. Chem.*, vol. 83, no. 20, pp. 7600–2, Oct. 2011.