

## Poster Presentation

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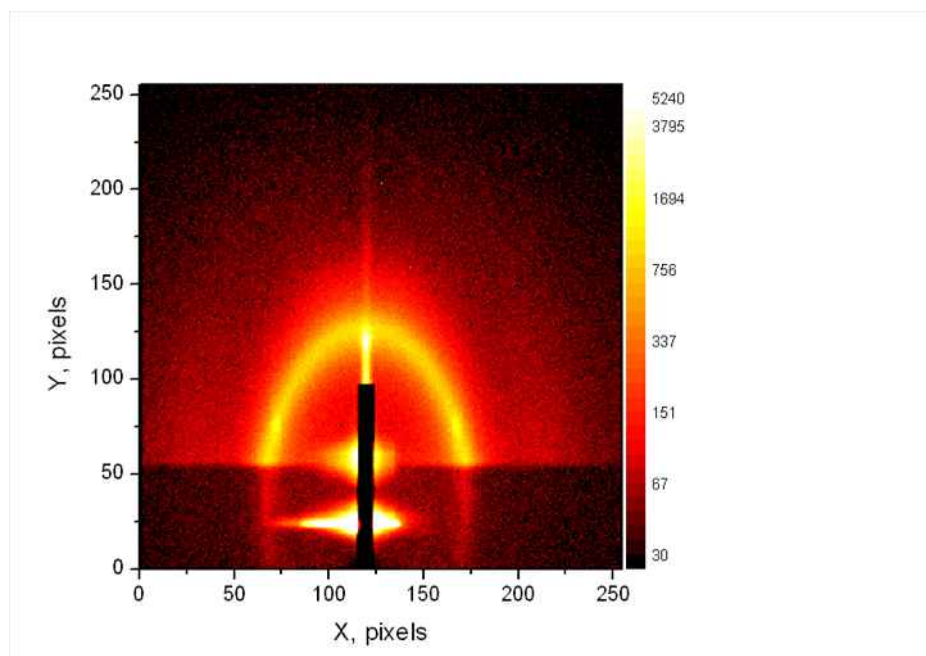
*GISAXS studies of mesoporous films using a standard laboratory diffractometer*

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With the increasing number of GISAXS (Grazing-Incidence Small-Angle X-ray Scattering) applications for the investigation of materials surface nano-structures, comes the demand for a mainstream laboratory capability to run alongside the more established synchrotron facilities. GISAXS poses considerable challenges when scaling the method to fit a multipurpose laboratory instrument, including the achievement of good angular resolution at small scattering radius, the reduction of scatter from the direct beam and the observation of low intensity signals. We have developed a hardware solution that addresses these challenges. The recent availability of small size pixel (55 micron) photon counting detectors with very low noise characteristics has enabled the implementation of new 2D imaging GISAXS hardware for a standard 1.8KW laboratory X-ray source. In this work we present a number of results that illustrate the capabilities of the new experimental set-up based on a standard multipurpose diffractometer. We present GISAXS images and analysis of a mesoporous silica thin film with close-packed hexagonal type ordering of the pores. In [1] we have reported reflectometry results and analysis of this sample structure. The addition of GISAXS information demonstrates the versatility of the multipurpose diffractometer and the strength in combining methods on one instrument. Strongly scattering Ti-filled silica mesoporous films illustrate the relative ease with which GISAXS signals can be recorded, including even the weak signal below the critical angle of the sample (fig.1). The scattering patterns from both samples exhibit subtle departures from a simple symmetry, suggesting that the films may exhibit residual strain. Thin films with vertical mesopores provide their own challenges in the observation of scatter close and parallel to the specularly reflected beam. We present results in which scattering from Co-filled mesopore structures with 37nm pitch can be clearly resolved.

[1] R. L. Rice, P. Kidd, J. D. Holmes and M. A. Morris, *J. Mater. Chem.* 15, 4032 (2005).



**Keywords:** Grazing-Incidence Small-Angle Scattering, X-ray Diffraction, Mesoporous Materials