

Development of reference standard for small angle scattering measurement q calibration

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We report on the development of a reference standard for q calibration of small angle scattering measurements. The standard consists of a 100 nm pitch line grating on a silicon nitride membrane. The grating is 100 nm tall and 40 nm wide tungsten lines. Tungsten was selected to give strong scattering intensity while not having absorption features around the carbon k-edge. The silicon nitride membrane allows measurements over a large range of beam energies. The test structure has a 1 μm two-dimensional grating superimposed on the 100 nm line grating. The superlattice provides additional scattering peaks that can only be resolved in high-resolution configurations. The test structure allows evaluation of q-resolution in addition to calibration of q.

The prototype structure was tested between 250 eV and 24.5 keV and provided strong scattering at all energies. Figure 1 shows an example scattering pattern collected in a 60 s exposure on a laboratory SAXS system using Ga K α . The scattering pattern allows calibration between 0.0006 \AA^{-1} and 0.1 \AA^{-1} . We will also discuss measurements made at SAXS beamlines and at soft X-ray scattering beamlines.

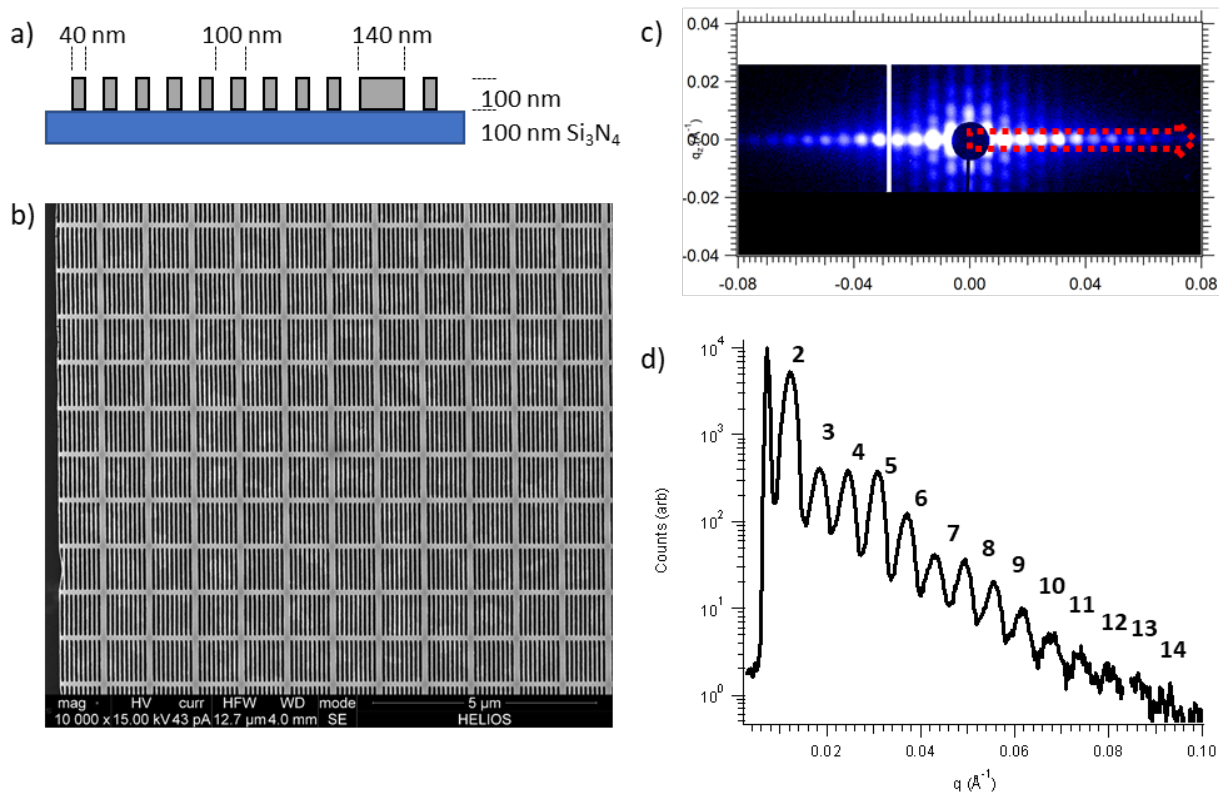


Figure 1. a) Schematic of tungsten test structure, b) SEM image of structure, c) lab SAXS pattern in 60 s, d) 1D integration .

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