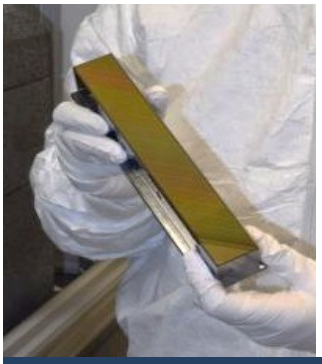
Inprentus PRECISION OPTICS



VLS DIFFRACTION GRATINGS (STANDARD)

Standard gratings can be ordered without consultation

Inprentus manufactures blazed diffraction gratings for x-ray and ultraviolet applications using a nano-scale, contact-mode lithography technique, a method of controlled mechanical deformation of metallic surfaces. This technology is particularly suited to x-ray and UV diffractive optics in which features must be shaped with 0.1 degree angular precision and positioned with nanometer precision over distances of tens of centimeters.

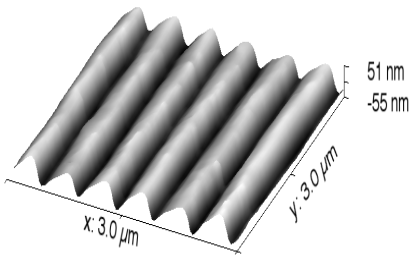
Mechanically Ruled VLS Blazed Diffraction Gratings (STANDARD)

SPECIFICATIONS

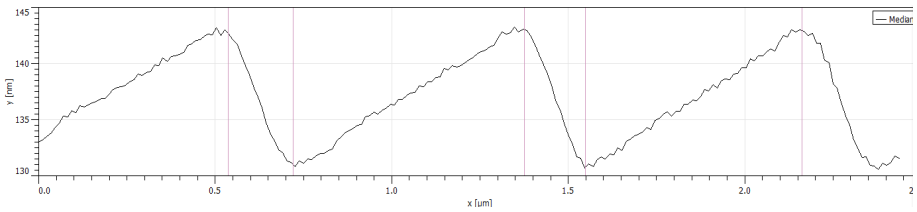
See Advanced Diffraction Grating datasheet for broader specifications

Parameter	Capability Range
Resolving power (λ/δλ):	Up to 50,000 for standard gratings
Blaze angle:	As low as 1.0° for standard gratings
Line Density:	500-2000 lines per mm *(see Advanced Gratings specifications for higher or lower values)*
VLS law:	$N(w) = a_0 + a_1 w + a_2 w^2 + a_3 w^3$
Substrates:	Planar or lightly curved (curvature down to 30 m). Single crystal silicon or fused silica
Dimensions:	Up to 300mm long x up to 60mm wide *(see Advance Gratings specifications for higher values)*
Coating:	Ti or Cr adhesion layer, 50nm - 100nm Au ruling layer
Overcoating:	Overcoating layers contracted through Inprentus are available on advanced diffraction gratings
Delivery:	6 mo. after receipt of order or 4 mo. after receipt of substrates, whichever is later
Warranty:	12 months after delivery

Blaze Angle Profiles



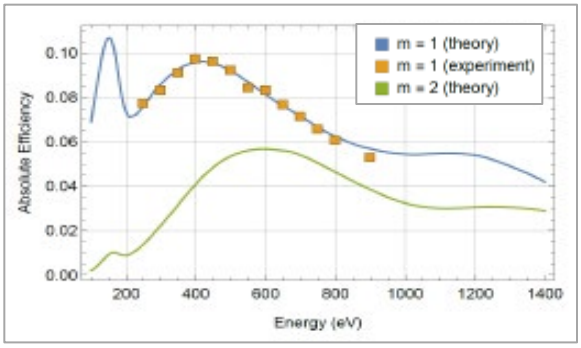
Left: 3D rendering of AFM traces of a grating pattern
Below: A single unsmoothed AFM trace of a 1500 lines/mm grating with a blaze angle of 1.1°



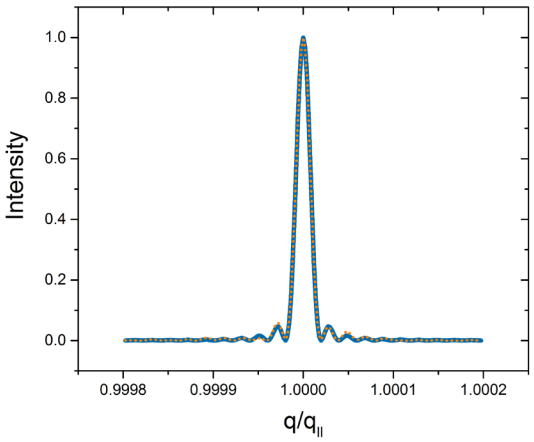
Efficiency Simulations

The 1st order diffraction of an Inprentus grating was measured and compared to Inprentus efficiency simulations. Efficiency simulations were conducted using real AFM data from blaze angle characterizations.

Inprentus simulation services are available with all grating purchases and provide reliable predictions of in-beamline grating efficiency.

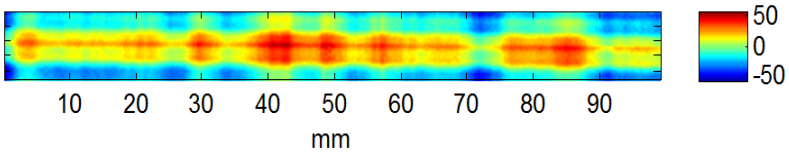


Resolving Power



Left: Resolution function, R(q), reconstructed from the Fizeau data below, showing a resolving power of E/ΔE = 50,400

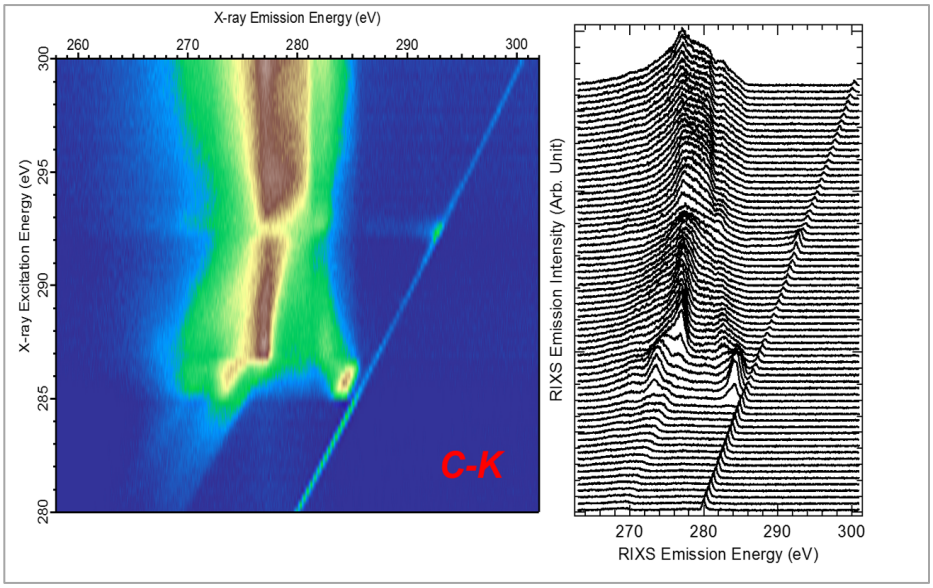
Bottom: Fizeau interferometry measurement in Littrow geometry of a uniform (non-VLS) 500/mm grating, taken by Brookhaven National Laboratory. The "height" in this image is a measure of the line density, showing the local variations.



Experimental Results from RIXS Applications

Right: Resonant Inelastic X-ray Scattering (RIXS) data from Beamline 8.0.1 at the Advanced Light Source at Lawrence Berkeley National Laboratory. The inclusion of an Inprentus grating into the RIXs endstation at Beamline 8.0.1 greatly enhanced the throughput of the experiment and increased the efficiency of data acquisition.

Related Publication: "High-efficiency in situ iRIXS endstation at the ALS" Qiao et al., Review of Scientific Instruments 88, 033106 (2017)



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