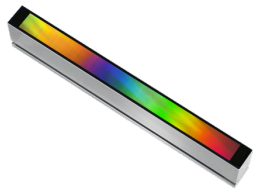
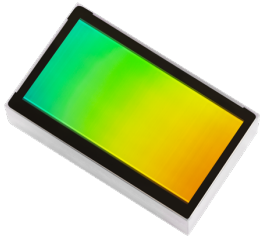
Inprentus™
PRECISION OPTICS

Spectroscopy Diffraction Gratings

Custom Blazed Diffraction Grating Masters for Optimized Efficiency

Inprentus manufacturing headquarters in Champaign, Illinois, USA





Inprentus offers custom blazed diffraction grating masters for spectroscopy applications where optimization of optical efficiency is a priority.

A modernized method for mechanical ruling of diffraction gratings

Low manufacturing yield has traditionally limited the industry, causing long lead times for grating delivery. The Inprentus method has revolutionized the core manufacturing process for blazed grating production, providing the industry with a valuable new source for high precision products. This new method offers improvements to critical specifications for a variety of optical diffraction applications. These improved specifications include optical bandwidth resolution and enhancements of optical efficiency.

Design to delivery: working with you throughout the process

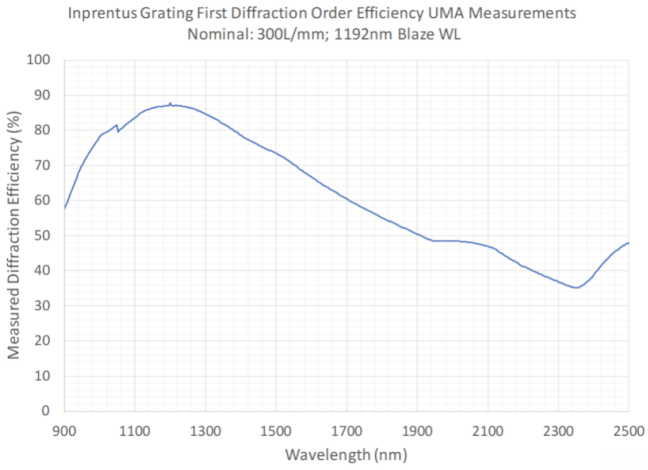
Inprentus will work with you to design and calculate simulated specifications and assist you with your grating design. Inprentus master gratings are sold with replication rights for use in your company's products.

Master gratings for ICP-OES applications

Inprentus has the ability to manufacture Echelle gratings, specifically optimized for high blaze efficiency. These can be used in a range of wavelengths in the UV to IR region and in a wide variety of sizes and specifications. The master gratings are used as is or with further replication in cutting-edge spectroscopy applications. Inprentus works closely with customers to provide custom blaze angles in the grating masters to enable optimized end-replication efficiency.

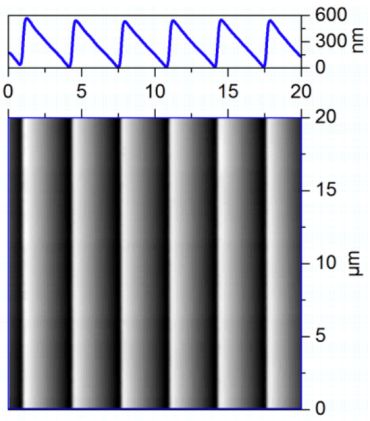
Performance: high grating efficiency

Inprentus 300 lpmm spectroscopy grating sample was verified to give more than 80% efficiency at design wavelength. The measurement was performed by a third party using an industry standard spectrophotometer.



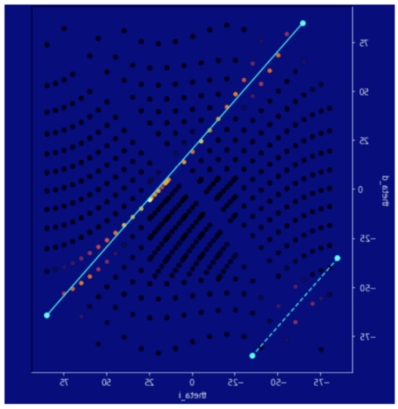
Nanomanufacturing: precision grooves

The 300 lpmm spectroscopy grating sample has been manufactured to have a blaze angle of 10.5° +/- 0.2°. An atomic force microscope (AFM) grayscale height map of manufactured grooves is shown below along with groove profile in blue.



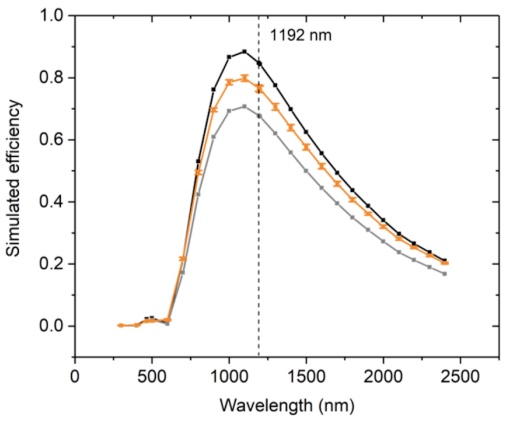
Metrology capabilities: blaze angle

Echelle grating angles are confirmed with a two-circle diffractometer technique using 543 nm light. Shown below are measured grating reflections at various incident and diffracted angles which are then compared with ideal groove reflections.



Support capabilities: efficiency simulation

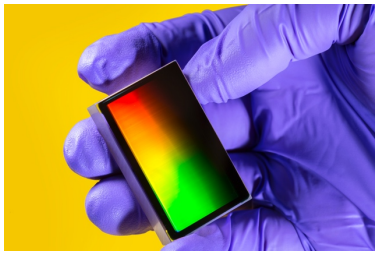
Proprietary simulation allows manufacturing set-up to be precisely modified until achieving grating yield efficiency (orange) above 80% (grey) of theoretical (black) efficiency. Simulated efficiency is included in the FAT report and agrees with measured performance (top left).



Applications

Typical product applications that would benefit from these improved diffraction grating specifications include optical emissions spectroscopy, x-ray and ultra-violet diffractive optics, and a variety of laser optics applications.

Specifications

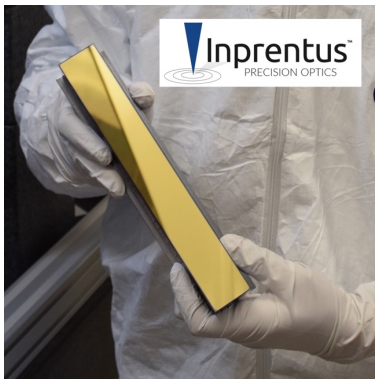


- Blaze angles from 0.1° to 80°
- VLS - Variable Line Spacing (VLS)
- Echelle gratings
- Ruling on curved substrates – concave, toroidal, elliptical
- Resolving power above 100,000 (*dependent on other specifications)*
- High damage threshold substrates and overcoatings available
- Dimensions up to 500 x 200mm
- Line densities from 50 to 3000 l/mm
- Gold (Au) coated ruling surface with silicon or fused silica substrates

Quality Control

Each Inprentus diffraction grating goes through a thorough optical testing procedure to assure conformance to customer specifications. The diffraction grating manufacturing process, testing program, and packaging operations ensure the highest standard of quality to provide gratings that are thoroughly clean and free from any organic low vapor pressure material or organic fluid. Each diffraction grating is measured with a variety of optical metrology instruments, and test results are provided with the delivery of each diffraction grating.

Inprentus



Inprentus has delivered custom blazed gratings to synchrotron & free-electron laser facilities and industrial laser companies around the world. The company's manufacturing operations include a variety of ruling machines that offer both high precision and high throughput, while maintaining the capability to produce a wide range of gratings. Inprentus' manufacturing center is staffed by world leading scientists engaged in the materials science, nanotechnology, and control system software development that is at the center of the company's expertise.

Contact Inprentus to get your diffraction grating project started

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