

# First results from a next-generation off-plane X-ray diffraction grating

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**Abstract** Future NASA X-ray spectroscopy missions will require high throughput, high resolving power grating spectrometers. Off-plane reflection gratings are capable of meeting the performance requirements needed to realize the scientific goals of these missions. We have identified a novel grating fabrication method that utilizes common lithographic and microfabrication techniques to produce the high fidelity groove profile necessary to achieve this performance. Application of this process has produced an initial pre-master that exhibits a radial (variable line spacing along the groove dimension), high density ( $>6000$  grooves/mm), laminar profile. This pre-master has been tested for diffraction efficiency at the BESSY II synchrotron light facility and diffracts up to 55 % of incident light into usable spectral orders. Furthermore, tests of spectral resolving power show that these gratings are capable of obtaining resolving powers well above 1300 ( $\lambda/\Delta\lambda$ ) with limitations due to the test apparatus, not the gratings. Obtaining these results has provided confidence that this

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