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**Single order X-ray diffraction with binary sinusoidal transmission grating** LEIFENG CAO, Research Center of Laser Fusion, China Academy of Engineering Physics — All existing x-ray dispersive devices including crystals, multilayers and diffraction gratings generate spectra in multiple orders, whereas soft x-ray spectroscopy applications usually require only the first order spectrum. The other diffraction orders can overlap and contaminate the first order spectrum of interest. In this letter we describe how an axis-symmetrically-distributed sinusoidal-shaped aperture with binary transmittance values can be used to disperse x-rays and with a superior diffraction pattern where, along its symmetry axis, all higher-order diffractions can be effectively suppressed. Hence this sophisticated dispersive element generates pure soft x-ray spectra in the first diffraction order, free from interference from higher diffraction orders.

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