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Silicon Nitride Diffraction Gratings On Platinum TEM Apertures

ALEXANDER SCHACHTNER, JORDAN PIERCE, TYLER HARVEY, JORDAN CHESS, TYLER YAHN, BENJAMIN MCMORRAN, University of Oregon — We use focused ion beam (FIB) nanofabrication to manufacture forked diffraction gratings capable of producing electron beams with helical wavefronts and orbital angular momentum (OAM). A vast number of unique beam modes carrying OAM can be produced through manipulation of grating fork number or position. Generally these gratings are milled such that they produce a phase shift in the beam and are used with high energy electrons (300keV) in a TEM to investigate the quantum or magnetic properties of the electron or image magnetic materials. Our latest work outlines an attempt to adhere these diffraction gratings, milled on silicon nitride membranes via FIB, to platinum SEM and TEM apertures in an effort to facilitate novel materials imaging capabilities as well as establish a long-term installation method. Methods for membrane-aperture adhesion are presented, as well as the diffraction grating production that takes place post-adhesion.

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