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Structural Characterization of Nanopatterned Surface Gratings with Grazing Incidence X-Ray Scattering ELAINE CHAN, DONG HYUN LEE, DMITRY VORONOV, HOWARD PADMORE, Lawrence Berkeley National Laboratory, TING XU, University of California, Berkeley, THOMAS RUSSELL, University of Massachusetts Amherst, ALEXANDER HEXEMER, Lawrence Berkeley National Laboratory — The fabrication of surface gratings with periodic, nanoscale features is a promising route for templating nanopatterned thin film materials with macroscopic lateral order. These materials can be utilized for constructing novel and improved micro- and opto-electronic devices and x-ray optical elements. To characterize the structural features of the grating substrates and templated thin films, grazing incidence x-ray scattering (GISAXS) is becoming an increasingly desirable and emerging technique because the method provides sufficiently high sensitivity. We investigate herein the structural features of gratings with sawtooth topologies using GISAXS. We characterize the GISAXS patterns of gratings prepared from silicon and sapphire substrates, and examine the emergence of specific features that appear for varying sawtooth aspect ratio and at different incident angle values. These features are further analyzed using theoretical calculations where feasible. In this manner we demonstrate the utility of GISAXS for characterizing the structures of nanopatterned surfaces.

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