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Defect engineering in periodic gradient-index optical thin films MATTHEW HAWKEYE, ANDY VAN POPTA, JEREMY SIT, MICHAEL BRETT, University of Alberta — For thin film deposition with obliquely incident vapour flux, ballistic shadowing limits growth to nucleation sites, forming a porous columnar microstructure. Combined with advanced substrate rotation in a technique known as glancing angle deposition (GLAD), precisely controlled nanoscale architectures are formed. *In situ* variation of the angle of incidence provides dynamic control of the resulting film porosity, allowing the design of continuously varying periodic refractive index profiles to produce thin film interference filters. Intentional nanostructural defects can be introduced, such as uniaxial and biaxial constant index layers or index profile discontinuities, creating defect modes in the filter optical stopbands. Structural and optical characterizations of these periodic structures were performed, with the goal of understanding the relationship between the spectral properties of the film and the engineered nanostructure, demonstrating the high degree of control obtainable over the resulting filter properties using the GLAD process.

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