

Abstract Submitted  
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**Silicon Wire Grid Polarizer for Deep UV Fabricated by Diblock Copolymer Lithography** KOJI ASAKAWA, YOUNG-RAE HONG, VINCENT PELLETIER, DOUGLAS ADAMSON, RICHARD REGISTER, PAUL CHAIKIN, Princeton University — Thin-shaped polarizers able to continuously polarize deep ultraviolet (UV) light below 300 nm were demonstrated using silicon wire grids with a 16.5 nm half-pitch stripe pattern. Conventional wire grid polarizers are capable of polarizing infrared and even some visible light, but are not for wavelengths below 300 nm due to their large pitch. To realize a deep UV polarizer, both a highly reflective material and an ultra-fine stripe pattern are required. While our group recently demonstrated aluminum wire polarizers [1], silicon shows greater reflectivity in the deep UV than aluminum. Block copolymer lithography was used to fabricate this ultra fine stripe pattern. A thin film of cylinder-forming polystyrene-polyhexylmethacrylate diblock copolymer (PS-PHMA, 21-64 kg/mol) was shear-aligned [2] and used as a mask for reactive-ion etching (RIE) to generate the 16.5 nm half-pitch stripe pattern of silicon nanowires on a transparent substrate. The finished polarizer showed polarization ability starting from the visible region and extending below 300 nm, including good polarization efficiency for 200 nm UV light. 1) Pelletier, et. al. Appl Phys Lett, 88, 211114 (2006), 2) Angelescu et al. Adv. Mater. 17, 1878 (2005)

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