Abstract Submitted
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Large Area Printing of 3D Photonic Crystals[1] JAMES J. WATKINS, MICHAEL R. BEAULIEU, NICHOLAS R. HENDRICKS, ROHIT KOTHARI, Department of Polymer Science and Engineering, Univ. of Massachusetts Amherst — We have developed a readily scalable print, lift, and stack approach for producing large area, 3D photonic crystal (PC) structures. UV-assisted nanoimprint lithography (UV-NIL) was used to pattern grating structures comprised of highly filled nanoparticle polymer composite resists with tune-able refractive indices (RI). The gratings were robust and upon release from a support substrate were oriented and stacked to yield 3D PCs. The RI of the composite resists was tuned between 1.58 and 1.92 at 800 nm while maintaining excellent optical transparency. The grating structure dimensions, line width, depth, and pitch, were easily varied by simply changing the imprint mold. For example, a 6 layer log-pile stack was prepared using a composite resist a RI of 1.72 yielding 72 % reflection at 900 nm. The process is scalable for roll-to-roll (R2R) production.

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