Abstract Submitted
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Simple thermal treatment for the size control of pore arrays in a polystyrene colloidal crystal films[1] RYAN M. JAMIOLKOWSKI[2], Pennsylvania Muscle Institute, University of Pennsylvania, Philadelphia, PA, USA, SHANE A. FIORENZA[3], Department of Physics, West Chester University of Pennsylvania, West Chester, PA, USA, KEVIN CHEN, ALYSSA M. TATE, Pennsylvania Muscle Institute, University of Pennsylvania, Philadelphia, PA, USA, SHAWN H. PFEIL, Department of Physics, West Chester University of Pennsylvania, West Chester, PA, USA, YALE E. GOLDMAN, Pennsylvania Muscle Institute, University of Pennsylvania, Philadelphia, PA, USA — Nanosphere Lithography (NSL) offers an attractive route to fabricating periodic structures with nanoscale features, without e-beam or deep UV lithography. In particular, it is uniquely suited to the low cost fabrication of large repeated arrays pores or pillars created by taking advantage of the interstitial spaces in close-packed monolayers of nano to micro-scale beads. However pore size, shape, and spacing cannot be controlled independently. We present both a robust method for producing large, approximately 1 cm^2, hexagonally close packed monolayer films of 1 micron diameter polystyrene beads on glass substrates, and thermal treatment of these films near the glass temperature, T_g, of polystyrene to modify the pore size. This builds on earlier work showing that pore size can be modified for colloidal crystals formed at a liquid gas interface [2]. These processes promise a simple, reproducible, and low cost route to periodic pore arrays for nano-photonic applications such as zero mode waveguides (ZMWs)

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