

Abstract Submitted  
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**Organosilicate Materials for High Resolution Patterning SOLES**

CHRISTOPHER, NIST — Organosilicate glasses (OSGs) of the form  $[\text{RSiO}_{1.5}]$ , where R is an organic functional group, have significant potential for nanoimprint lithography (NIL). We present and quantify two methods for fabricating NIL molds from OSG materials. The first utilizes conventional NIL templates, with patterns as small as 10 nm being directly imprinted into as-cast OSG films. The imprinted patterns are vitrified into hard ceramic-like materials that can then be used to imprint subsequent replica patterns with high fidelity. The second uses monomers where the R group is chosen to selectively render the OSG soluble in the polyethylene oxide (PEO) domains of a PEO-PS (PS being polystyrene) diblock copolymer. At elevated temperatures the BCP burns off while the OSG converts into a hard pattern. The resulting OSG patterns are templates of the PEO domains and can be used directly as a NIL molds to replicate the former BCP morphology into a range of materials. This approach offers incredible latitude in tuning the BCP morphology. The surface patterns can be driven through most of the morphologies of the BCP phase diagram by changing the ratio of the OSG to the BCP in the spin casting solution. These physics of these surprising results are discussed in detail.

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