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Formation of Hierarchical Silica Nanochannels through Nanoimprint Lithography – Supporting Information

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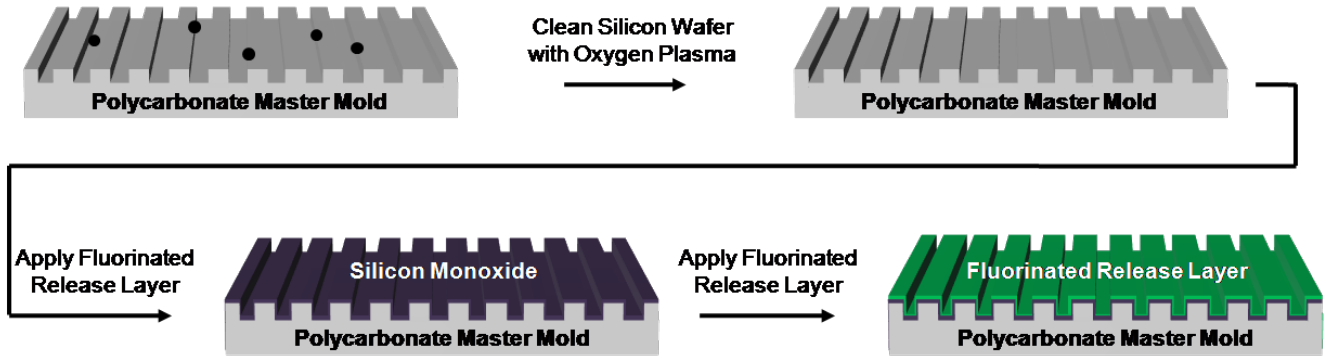
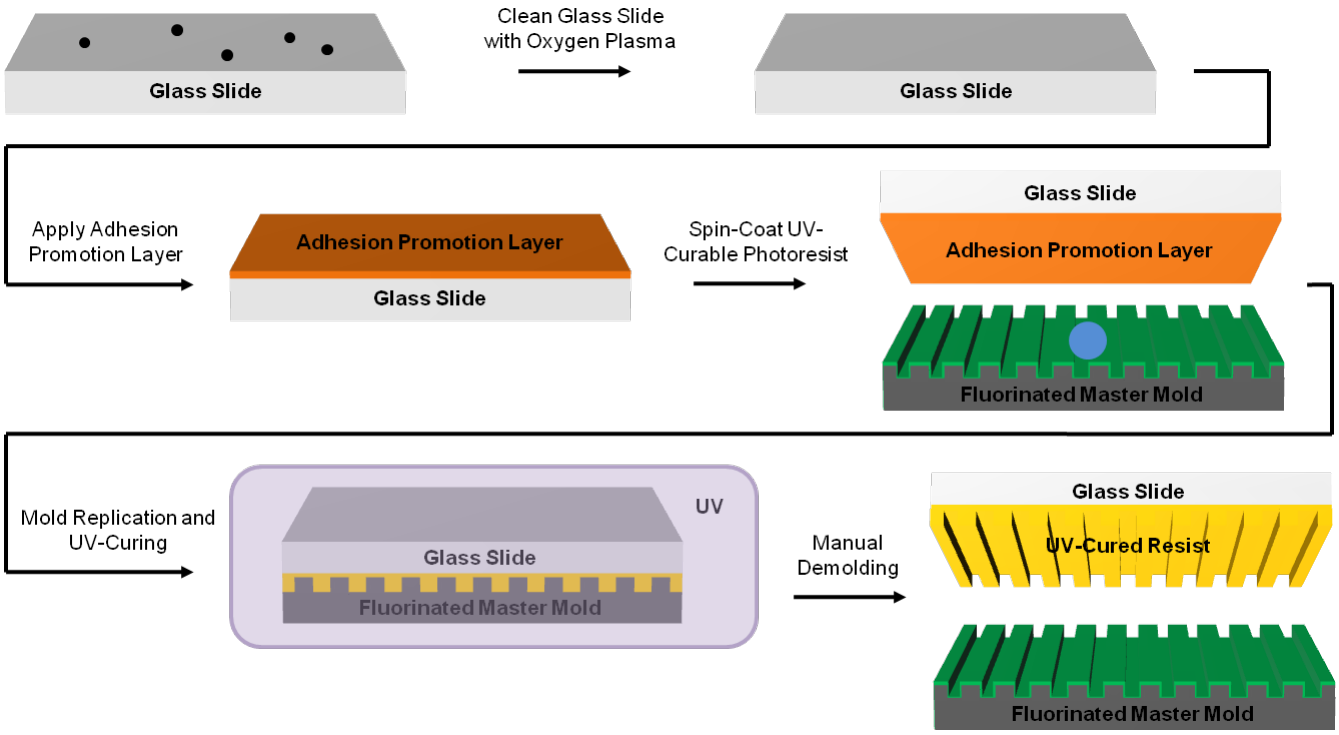


Scheme S1. Process to apply fluorinated release layer to a polycarbonate master mold.

To provide a release layer for the polycarbonate master molds, the molds are initially rinsed with ethanol and IPA and dried under a stream of N_2. To provide an anchoring site for the release layer, a thin layer, ~ 10 nm, of silicon monoxide (99.9%, Kurt J. Lesker) is deposited via thermal evaporation. Once the silicon monoxide layer is deposited on the polycarbonate master mold, it is etched in O_2 plasma from an inductively coupled plasma (ICP) etcher (30 W, 100 mTorr) for 1 minute to activate the surface for further functionalization. With the surface of the polycarbonate master mold populated with reactive functional groups, the mold is exposed to a 1 vol. %, with respect to the reactor volume, of

heptadecafluoro-1,1,2,2-tetrahydrodecyl) dimethyl chlorosilane (Gelest) at 80 °C for 24-48 hours to generate the fluorinated release layer self assembled monolayer (SAM).



Scheme S2. Process of mold replication.

The replication of the fluorinated master molds begins by applying the adhesion promoter molecule to the surface of a glass slide. The process to apply the SAM of the adhesion promoter to the glass slide is identical to the process used for applying the SAM of the adhesion promoter to the silicon wafer. With the adhesion promoted glass slides and fluorinated master molds available, a microscopic amount, on the order of microliters, of the UV curable photoresist is applied to the center of a fluorinated master mold. The adhesion promoted glass slide is then gently placed on top of the fluorinated master mold and exposed to 365 nm UV radiation from a 500 W OAI UV-lamp (12.7 mW/cm^2) in a N_2 environment for 15 minutes. The replicated mold is then manually de-molded from the fluorinated master mold by the aid of a razor blade and compressed air.

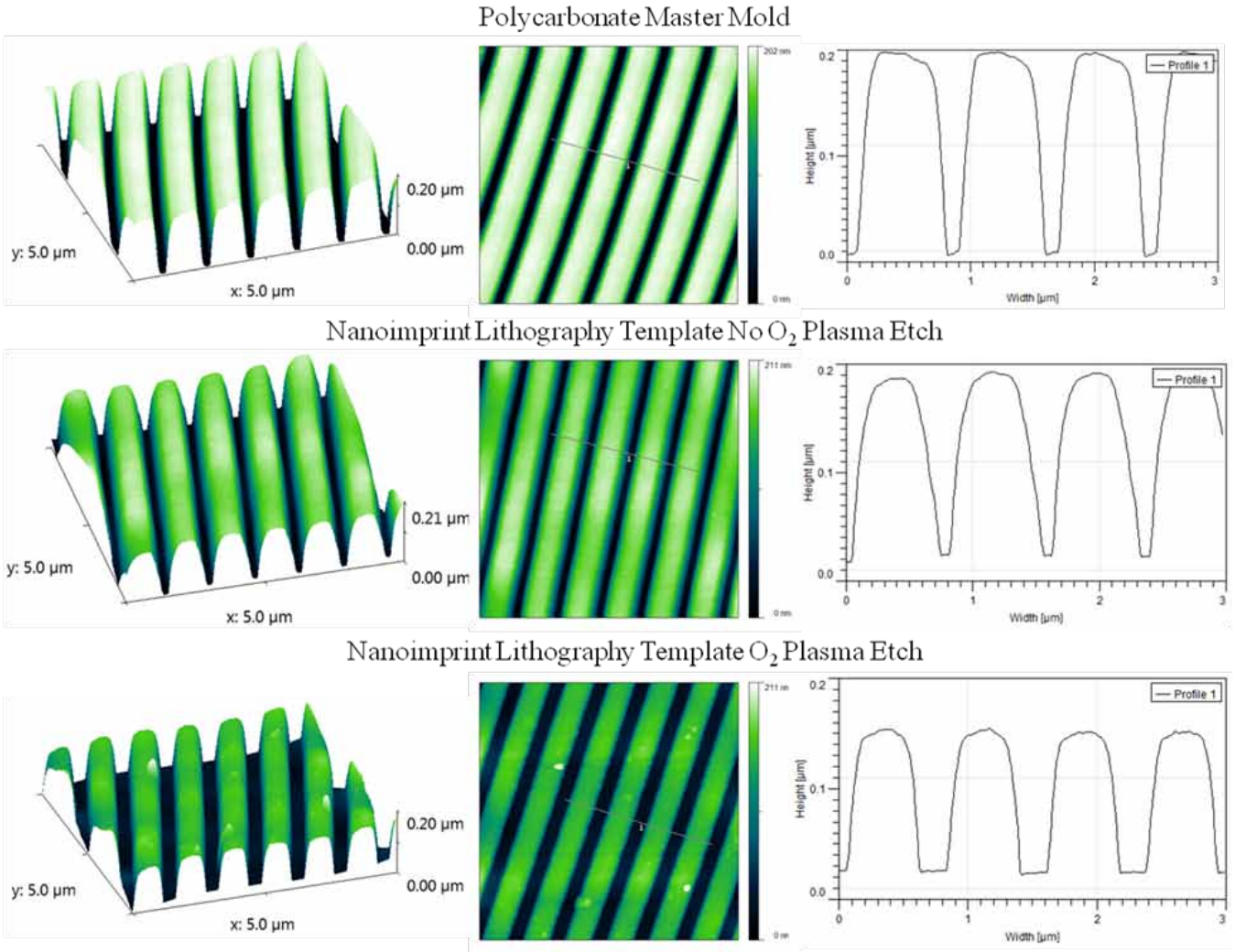


Figure 3. Progress of ICP-RIE O_2 plasma etch to yield free-standing nanostructures.