

Supplementary information

Selection of UV Resins for Nanostructured Molds for Thermal NIL

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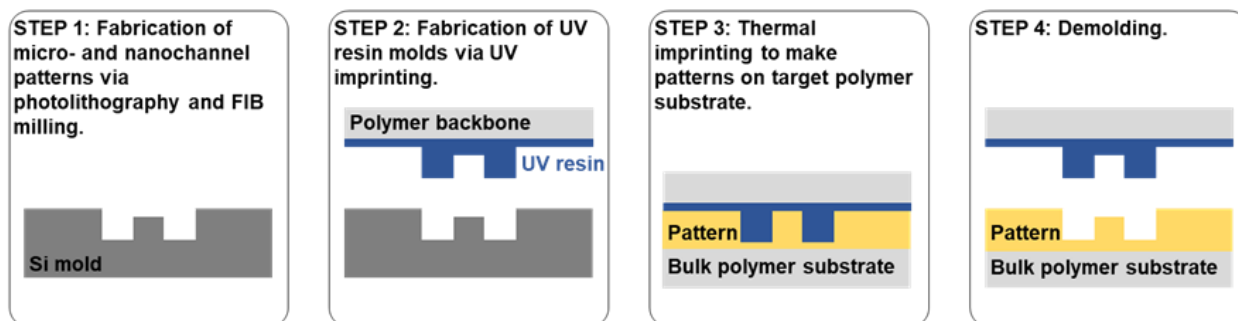
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Prof. Sunggook Park

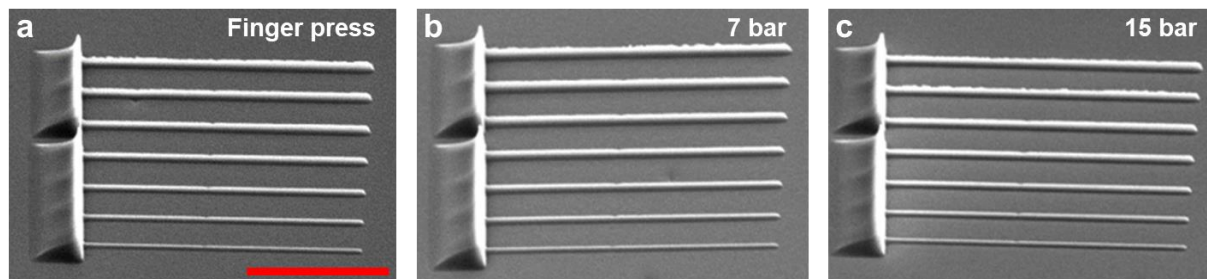
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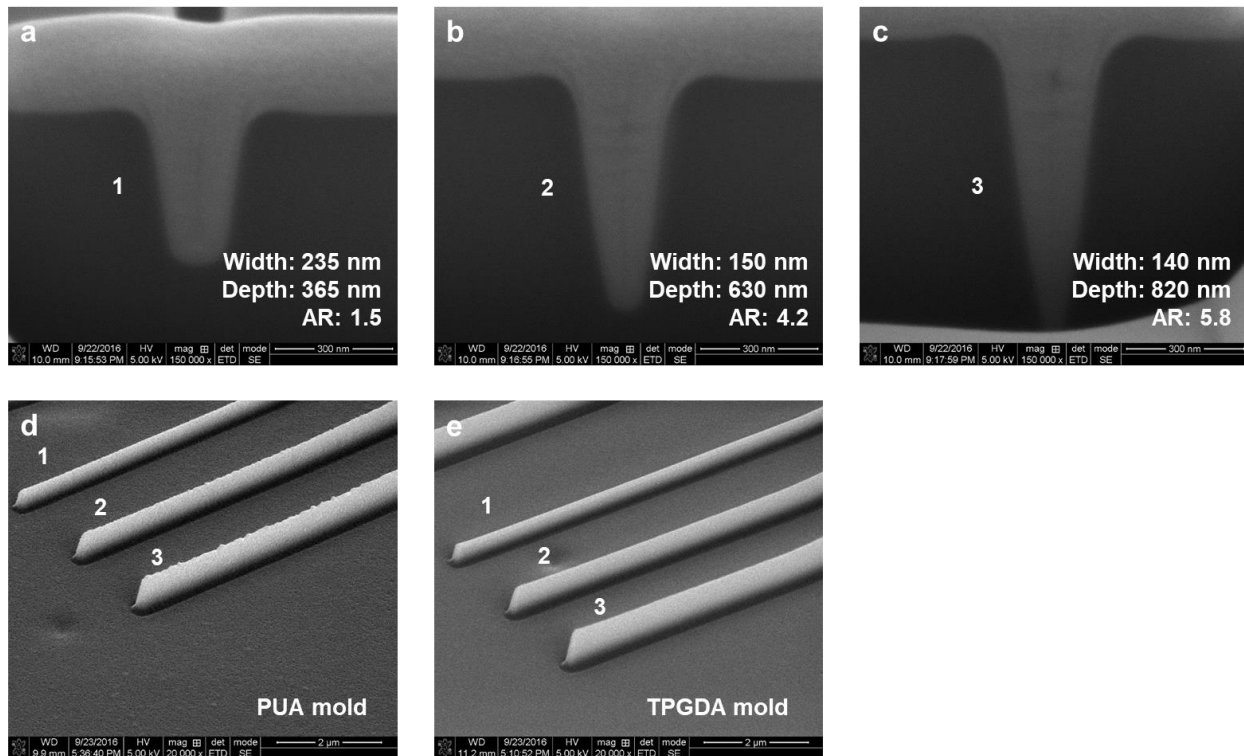
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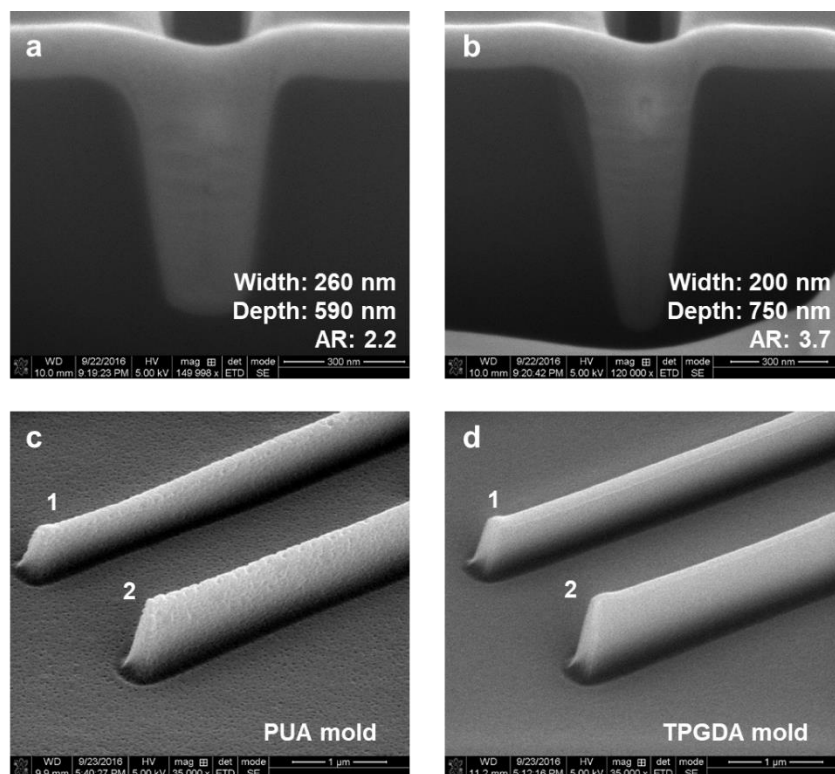
Supplementary Fig. 1 Schematics of a process to fabricate a UV-resin mold and to replicate patterns by using the UV-resin mold. Step 1 and 2 are fabrication of UV-resin mold from Si master mold by UV-NIL. Step 3 and 4 are fabrication of nanostructures on thermoplastic materials by thermal-NIL.



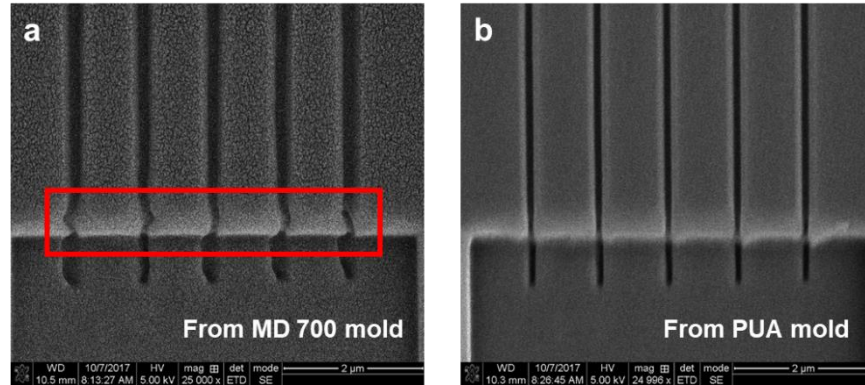
Supplementary Fig. 2 SEM images of PUA resin molds from nanochannels with different aspect ratio (taken with a tilt angle of 52° , scale bar $5\ \mu\text{m}$). From top to bottom, aspect ratio decreases. Although certain pressures were applied, high aspect ratio nanochannels cannot be replicated well. UV-resin monomer size is the key to achieve a good UV-resin filling into sharp nanostructures.



Supplementary Fig. 3 Top: cross-sectional profiles of 200 nm width (FIB milling setting value) nanochannels with different channel depth; Bottom: replicated PUA and TPGDA resin molds (taken with a tilt angle of 52°). For PUA resin, replication limit for 200 nm width sharp nanochannels is about 4 (aspect ratio).



Supplementary Fig. 4 Top: cross-sectional profiles of 300 nm width (FIB milling setting value) nanochannels with different channel depth; Bottom: replicated PUA and TPGDA resin molds (taken with a tilt angle of 52°). For PUA resin, replication limit for 300 nm width sharp nanochannels is about 3.7 (aspect ratio).



Supplementary Fig. 5 SEM images of imprinted COC substrates by using MD700 and PUA molds. Defects can be found on COC substrate imprinted by MD 700 resin mold at the nanochannel/inlet interface (indicated in red box) but not the one by PUA resin mold. Such defects can be explained by the stress concentration at structural corners and low Young's modulus of cured MD 700 resin mold.