

## Large area micro-patterning via BOE treated PDMS stamping technique

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We introduce a simple and selective patterning technique using buffered oxide etchant (BOE) treated PDMS stamp. Various line and checker-board patterns of PDMS with a width of a few  $\mu\text{m}$ s to 300 nm and a height of 30 nm could be transferred onto  $\text{SiO}_2$  substrates via stamping of BOE-treated patterned PDMS. Of particular interest, PDMS was selectively transferred onto remaining bare  $\text{SiO}_2$  area when the PDMS stamp was subsequently stamped onto the pre-patterned  $\text{SiO}_2$  substrate. PDMS was not transferred onto metal surfaces such as Au. Thus, direct transfer of BOE-treated PDMS pattern showed a strong selectivity onto  $\text{SiO}_2$  substrate. We attribute the transfer mechanism to the interaction of BOE with  $\text{SiO}_2$  as well as the weakening of PDMS bonding by BOE.

Additionally, we also fabricated the PDMS/ $-\text{NH}_2$  chemically functionalized pattern by printing of BOE treated PDMS stamp onto 3-aminopropyltriethoxy silane (APS) treated substrate. When such patterned substrate was immersed in  $\text{V}_2\text{O}_5$  nanowire solution, the nanowire channels could be obtained by selective adsorption of  $\text{V}_2\text{O}_5$  nanowires onto APS region due to electrostatic interaction between the negatively charged nanowires and positively charged APS molecules. We also measured the electrical conductivity through the channels of percolating  $\text{V}_2\text{O}_5$  nanowires.