Three-Dimensional Nanofabrication with Nanotransfer Printing and Atomic Layer Deposition

We report a new patterning technique of inorganic materials by using thin-film transfer printing (TFTP) with atomic layer deposition. This method consists of the atomic layer deposition (ALD) of inorganic thin film and a nanotransfer printing (nTP) that is based on a water-mediated transfer process. In the TFTP method, the Al2O3 ALD growth occurs on FTS-coated PDMS stamp without specific chemical species, such as hydroxyl group. The CF3-terminated alkylsiloxane monolayer, which is coated on PDMS stamp, provides a weak adhesion between the deposited Al2O3 and stamp, and promotes the easy and complete release of Al2O3 film from the stamp. And also, the water layer serves as an adhesion layer to provide good conformal contact and form strong covalent bonding between the Al2O3 layer and Si substrate. Thus, the TFTP technique is potentially useful for making nanochannels of various inorganic materials.