Continuous Particle Self-Arrangement in a Long Micro-Capillary

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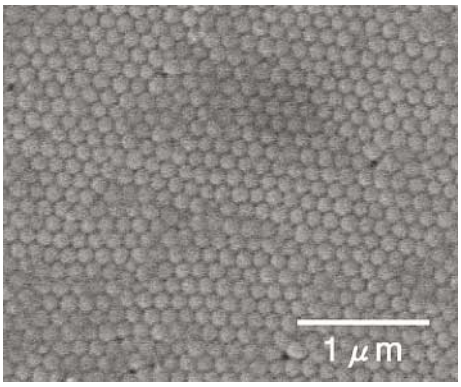
A methodology has been set up to produce continuous particle arrangement in a long capillary. No additional drawing force is needed, the arrangement is a kind of self-assembly. Hexagonal arrangement can be obtained on the inner wall of a micro-capillary as shown in Fig.1, and thickness can be controlled from monolayer to multilayers. This type of particle arrangement was stable in both static and dynamic water and its vertical structure can be designed with layer by layer process. Using a patterning technology, it is also possible to control two- dimensional particle arrangement distribution. The structure produced by this method has extensive application in the microreactor field, such as catalyst utilizing its high surface area, separation utilizing uniform voids between the particles, and nano-device controlling three-dimensional structure.



Particle arrangement on the inner wall of a micro-capillary

Direct Observation of Nanomolecular Motion by STM

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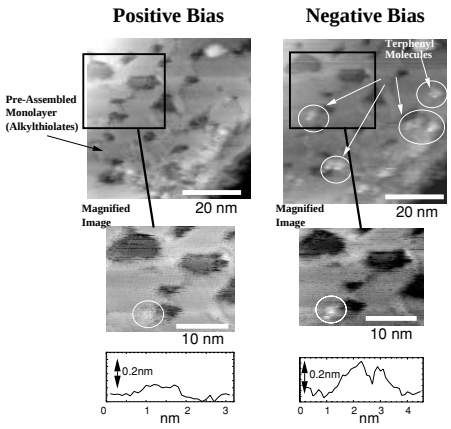
Nanoscale molecular motion induced by polarity change of the electric field was observed by Scanning tunneling microscopy(STM) when small amounts of mobile terphenyl molecules were embedded into pre-assembled dodecanethiol self-assembled monolayers (SAMs). At the positive tip bias, few of protrusions were observed. When the STM tip bias turned to negative, many protrusions appeared on the binary monolayer surface. The result demonstrated the single molecular mechanical device operation at the nanometer scale.



STM images of terphenyl molecules embedded into pre-assembled monolayer.Left; At the positive bias Right; at Negative bias