Addressable Protein Patterning via Switchable Superhydrophobic Microarrays

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Inspired by the water-repellent behavior of the micro and nanostructured plant surfaces, superhydrophobic surfaces have received a lot of research attention. Also, surfaces with switchable wettability have aroused great interest because of their applications as biosensors, bimolecular patterning, microfluidic devices, and so on. In this study, we reported a simple fabrication method for creating well-ordered micro-arrays containing 3D nanostructured superhydrophobic surfaces. Those superhydrophobic micro-arrays were prepared by holographic lithography using top-cut pyramid microprism-arrays, and reactive ion etching. It has been demonstrated that a superhydrophobic surface can be converted to a wetted surface using the electrowetting effect. In our work, the electrowetting effect was used as the activation mechanism for the switchable superhydrophobic surface. The superhydrophobic surface was resistant to the absorption of proteins, and once converted to a wetted state, the same surface promoted protein absorption. These switchable superhydrophobic surfaces enable the design of functional multicomponent protein arrays.