Electrospun Binary Micro-Nanoscale Structured Fibers for Superhydrophobic Films

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Some surfaces found in nature have self-cleaning properties. Such surfaces have the unusual wetting characteristic of superhydrophobicity (contact angle > 150°), and water droplets on the surface readily roll off when the contact angle hysteresis is negligible. Thus, surface dust and debris can be removed. Recently, some research groups have introduced porous films of beaded electrospun nanofibers to create superhydrophobic surfaces. However, control of the microscopic surface morphology of nanofibers at multiple length scales in order to control their physico-chemical properties more precisely still poses a significant challenge. In the present work, we demonstrate a simple method for continuous production of electrospun nanofibers with rough surfaces at a dual-length scale from mixtures of bidisperse colloids and polymers. The porous films of electrospun beaded nanofibers of bidisperse colloids are then hydrophobically modified with fluorinated silane coupling agents. Superhydrophobic surfaces with low sliding angle were thereby successfully prepared.