Fabrication of superhydrophobicWOx nanowire array and analysis of their underwater stability

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Superhydrophobic W18O49 nanowire (NW) arrays were synthesized using a thermal evaporation and surface chemistry modification methods by self-assembled monolayer (SAM). As fabricated superhydrophobic W18O49NWs surface shows water contact angle of 163.2° and has reliable stability even in underwater conditions. Also the non-wetting W18O49 NWs surface exhibits silvery surface by total reflection of water layer and air interlayer. This novel phenomenon is an obvious evidence of the Cassie-Baxter state of surface modified W18O49NWs arrays. The stability test of underwater superhydrophobicityof W18O49NWsarrayswas conducted by changing hydrostatic pressure and surface energy of W18O49 NWs arrays. The stability of superhydrophobicity in underwater conditions decreased exponentially as hydrostatic pressure applied to the substrates increased. In addition, as surface energy decreased, the underwater stability of superhydrophobic surface increased sharply. Specifically, superhydrophobic stability increased exponentially as surface energy of W18O49 NWs arrayswas decreased.