Surface chemically modified superhydrophobic stability of $W_{18}O_{49}$ nanowire arrays submerged underwater

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Superhydrophobic $W_{18}O_{49}$ nanowire (NW) arrays were fabricated using a simple thermal evaporation and surface chemistry modification methods. As synthesized superhydrophobic $W_{18}O_{49}$ NWs surface with water contact angle of 163.2° has shown reliable stability even in submerged underwater conditions. Also the superhydrophobic $W_{18}O_{49}$ NWs surface exhibits silvery surfaces by total reflection of water layer and air pockets as an evidence of the presence of air interlayer. The stability of superhydrophobicity in underwater conditions decreased exponentially as hydrostatic pressure applied to the substrates increased. In addition, variations in stability were investigated according to changes in the surface energy of W18O49 NW arrays. As surface energy decreased, the underwater stability of superhydrophobic surface increased sharply. Based on these results, the models explaining tendencies of superhydrophobic stability underwater resulting from hydrostatic pressure and surface energy were designed.