Stability analysis of surface chemistry modified superhydrophobic $W_{18}O_{49}$ nanowire arrays submerged underwater

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Superhydrophobic WOx nanowire (NW) arrays were synthesized using a thermal evaporation and surface chemistry modification methods by self-assembled monolayer (SAM). As fabricated superhydrophobic WOx NWs surface shows water contact angle of 163.2° and has reliable stability even in underwater conditions. Also the non-wetting WOx NWs surface exhibits silvery surface by total reflection of water layer and air interlayer. The stability test of underwater superhydrophobicity of WOx NWs arrays was conducted by changing hydrostatic pressure and surface energy of WOx 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, sueprhydrophobic stability increased exponentially as surface energy of WOx NWs arrays was decreased. Based on these results, the models for explaining tendencies of superhydrophobic stability underwater resulting from hydrostatic pressure and surface energy were designed.