Stability analysis of surface chemistry controlled superhydrophobic Tungsten Oxide($W_{18}O_{49}$) nanowire arrays submerged underwater

이정한, 용기중*
포항공과대학교
(kyong@postech.ac.kr*)

Superhydrophobic W18O49 nanowire (NW) arrays were synthesized using a thermal evaporation and surface chemistry modification methods by self-assembled monolayer(SAM). As fabricated superhydrophobic W18O49 NWs surface shows water contact angle of 163.2°and has reliable stability even in underwater conditions. This novel phenomenon is an obvious evidence of the Cassie-Baxter state of surface modified W18O49 NWs array. The stability test of underwater superhydrophobicity of W18O49 NWs arrays was 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 increased3. In addition, as surface energy decreased, the underwater stability of superhydrophobic surface increased sharply. Specifically, sueprhydrophobic stability increased exponentially as surface energy of W18O49 NWs arrays was decreased. The combination of fugacity and Laplace pressure explained this exponential decay of stability according to hydrostatic pressure and surface energy.