One-Step Synthesis of Biomimetic Superhydrophobic Nanofibers Copper Stearate Film Electrodes via Electrochemical Deposition Method

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Superhydrophobicity is a physical property of a material wherein a drop of water beads up into a spherical shape having a static contact angle greater than 150 degrees. Inspired by lotus leaf, this study synthesized superhydrophobic copper stearate through electrochemical deposition method. Surface morphological assessment was done using scanning electron microscopy (SEM). Energy Dispersive X-ray (EDX) was conducted for elemental analysis. X-ray diffraction (XRD) was employed for structural orientation and particle size determination. Hydrophobicity effect was determined via water contact angle (WCA) measurement. Superhydrophobicity of copper stearate, with contact angle of 155.00 degrees, was achieved using 10 volts applied voltage on the two copper electrodes. Using 1 volt and 18 volts, the prepared copper stearate was hydrophobic. Copper plate served as the control sample, which acquired a hydrophilic contact angle of 70.56 degrees. The acquired anti-wetting property of the samples was due to the micro/nano-roughness of their surfaces. In between this roughness were voids in which air could be trapped. Changes of surface morphology from star-like to smoke-like and fog-like microstructure were observed after voltages application. Another significant effect due to variation of voltages was the widening of nanofibers that resulted to an increase in particle size leading to a petal-like particles and feather-like particles. Among the three experimental samples, CS10V was the closest to the stoichiometric C:O:Cu atomic ratio of copper stearate. Thus, the synthesized copper stearate films could be applied potentially in the field of electronics especially in making gadgets with self-cleaning property, water repellency, and anti-wetting property.

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