Preparation of a Superhydrophobic and Oleophilic Membrane Inspired by Taro Leaves for Oil-Water Separation

Girish, Devika (School: St. Peter's Senior Secondary School)
Varghese, Sara (School: St.Peter's Senior Secondary School)

Taro (Colocasia esculenta) is an edible aroid, extensively grown all around the world and the most ancient cultivated crops. It is also a nutritional food as well as medicine. The presence of fine needle-like crystals or raphides on the surface which is estimated to be made up of calcium oxalate crystals is responsible for hydrophobicity of the leaves. Inspired by them, super hydrophobic and oleophilic membranes with hierarchical surface roughness are fabricated. An oleophilic and hydrophobic electrospun nanocomposite based on ABS and ZnO nanoparticles (ZnO NPs) were fabricated. Calcium Oxalate is also proposed as an additional filler. The ABS membrane shows entangled nonwoven fibers having smooth surface with an average fiber diameter of 1.0 μm. Both ABS and ABS/ZnO nanocomposite membranes are found to be hydrophobic with a water contact angle of 135º. The ABS/ZnO nanocomposite membrane displayed superoleophilicity without any markable angle in the contact angle measurements. Owing to this superoleophilic nature, ABS and ABS/ZnO nanocomposite membrane is capable of selectively absorbing and transporting oil from oil-water mixture without the use of any external stimuli. The oleophilic nature of the membrane is applicable for both mineral oil and natural oils. Hence this superoleophilic membrane can be proposed for water purification applications.

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