

A super hydro-oleophilic bio-inspired rice leaf surface fabricated by Fused Deposition Modeling 3D printing method for the oil self-transportation

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Recently, bio-inspired rice-leaf (RL) surface attracted wide interest because of its advanced properties including liquid transportation, repulsion, and separation. However, the main drawback is its fabrication procedure, which is complex and involves the usage of toxic materials. In this study, we introduce a new method for generating bioinspired RL surface via the Fused Deposition Modeling printing method without initial design. The printing procedure based on the XZ and XY direction allows fabricating the desired surface. Despite having the same slicing model, the surface printed with XZ direction is significantly smoother and more uniform, as compared to the XY direction. The application of the developed method results in a higher printing resolution in the XZ direction. Via control of the printing parameters such as layer heights in a range of 30 up to 200 μm , we generated a super hydro-oleophilic rice-leaf surface with a contact angle below 10° using diiodomethane. Scanning electron microscope (SEM) images and confocal laser scanning microscopy (CLSM) image analysis confirmed that the surface with the highest roughness factor was printed by 200 μm of layer height.