

Shark Skin-mimetic Small Structure Created by Photo-reconfigurable Azopolymer for Low Drag Surfaces

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Sharks, marine creatures that swim fast and have an anti-fouling ability, possess dermal denticle structures of micron-size. Because the riblet geometries on the denticles reduce the shear stress by encouraging an anisotropic flow parallel to the stream-wise direction of the fluid, sharks have low-drag and anti-fouling skins. Although much attention has been given to shark skin inspired low-drag surfaces, it remains an important challenge to mimic denticle structures in the micron-scale and to control their structural features. This paper presents novel method to create shark skin-mimetic denticle structures for low drag by exploiting a photo-reconfigurable azopolymer. The light-designed denticle structure exhibits super-hydrophobicity and an anti-fouling effect as sharks do. This work suggests that our novel photo-reconfiguration technology, mimicking shark skin and systematically manipulating various structural parameters, can be used in a reliable manner for diverse applications requiring low-drag surfaces.