Testing Trichomes Designs of 3D Microstuctures using Multiphoton Polymerization: Toward Hydrophobic Surfaces

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ABSTRACT

Arrays of hierarchical microstructures are considered nowadays as an important method to create hydrophobic surfaces[1]. Here, we use femtosecond 3D printing to manufacture microstructures in different geometric patterns. Our method gives sub-micrometer accuracy so that direct manufacturing is possible[2]. Direct laser writing and, in particular, multiphoton polymerization lithography (MPL) with ultrafast laser pulses has taken additive manufacturing, also known as '3D Printing', all the way down to the sub-micrometer scale. MPL is a 3D nanoscale manufacturing tool that offers great potential for rapid prototyping and the manufacture of photonic devices, tissue scaffolds and biomechanical parts[3]. In this study, we demonstrate the tuning of wetting performance of surfaces via trichomes designs of 3D microstructures. With this technique, the role of the design of the 3D microstructures can be better understood, facilitating the applications, for which robust wetting control is required. We determine the intrinsic hydrophilicity of the hybrid sol-gel polymer SZ2080 and subsequently micro-structured surfaces.

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