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Liam R.J. Scarratt, Ullrich Steiner, Chiara Neto

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A Review on the Mechanical and Thermodynamic Robustness of Superhydrophobic Surfaces

Liam R. J. Scarratt,[1] Ullrich Steiner,[2] Chiara Neto[1,*]

[1] School of Chemistry and Australian Institute for Nanoscale Science and Technology, The University of Sydney, NSW 2006 Australia

[2] Adolphe Merkle Institute, University of Fribourg, Chemin des Verdiers 4, CH-1700 Fribourg, Switzerland

* Corresponding author: chiara.neto@sydney.edu.au

Abstract

Advancements in the fabrication and study of superhydrophobic surfaces have been significant over the past 10 years, and some 20 years after the discovery of the lotus effect, the study of special wettability surfaces can be considered mainstream. While the fabrication of superhydrophobic surfaces is well advanced and the physical properties of superhydrophobic surfaces well-understood, the robustness of these surfaces, both in terms of mechanical and thermodynamic properties, are only recently getting attention in the literature. In this review we cover publications that appeared over the past ten years on the thermodynamic and mechanical robustness of superhydrophobic surfaces, by which we mean the long term stability under conditions of wear, shear and pressure. The review is divided into two parts, the first dedicated to thermodynamic robustness and the second dedicated to mechanical robustness of these complex surfaces. Our work is intended as an introductory review for researchers interested in addressing longevity and stability of superhydrophobic surfaces, and provides an outlook on outstanding aspects of investigation.

Keywords

Superhydrophobic surfaces, mechanical robustness, plastron stability, roughness, mechanical testing, Cassie State

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