



Bio-Inspired Wettability Surfaces: Developments in Micro- and Nanostructures

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Through natural evolution in thousands of years, biosurfaces have become highly adaptable to display their biological functions perfectly. Interestingly, they have developed micro-/nanostructures with gradient features to achieve smart wetting controls, such as ultra-hydrophobic water repellency in lotus leaf, directional water collection in wetted spider silk, directional adhesion in superhydrophobic butterfly wing, and fog-collecting hydrophobic/hydrophilic pattern on beetle back. These surfaces provide endless inspiration for the design and fabrication of functional interface materials with unique wettability, generating promising applications such as micro-fluidic devices, functional textiles, corrosion resistance, liquid transportation, antifogging, and water-collecting devices. In recent years there has been an exciting confluence of research areas of physics, chemistry, biology, and materials science to develop functional micro- and nanosurfaces. A kernel consists of organic materials with high/low surface energy and regular/irregular order/disorder, which can be rough/smooth and endlessly arranged and combined with various styles of micro- and nanostructures.

This book introduces recent research on wettability of biological and bio-inspired surfaces. It discusses the mechanism of smart wetting controls, such as water collection/repellency on biological micro-/nanostructure gradient interfaces. It suggests ways to mimic these biological features to realize bio-inspired functional surfaces with unique wettability. The book will help researchers innovate designs with novel materials for future scientific works.

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