Preface

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One contribution of 12 to a theme issue
'Bioinspired hierarchically structured surfaces
for green science'.

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Preface

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Nature has gone through evolution over the 3.8 billion years since life is believed to have appeared on the Earth. It has evolved species with high performance using commonly found materials and rather basic fabrication techniques. Biomimetics means mimicking biology or living nature. Biomimetics research allows derivation of optimal designs benefitting from improvements made during the evolution of living nature and efficient use of natural resources in a more sustainable and environmentally friendly (green) manner. Bioinspiration or biodesign would be a more appropriate term as it applies to engineering. The field is highly interdisciplinary, involving understanding biological functions, structures and principles of various objects found in nature by biologists, physicists, chemists, material scientists, engineers, and even artists and architects. Biological materials are highly organized from the molecular to the nano-, micro- and macroscales, often in a hierarchical manner with intricate nanoarchitecture that ultimately makes up myriad functional elements. Properties of materials and surfaces result from a complex interplay between surface structure and morphology and physical and chemical properties. Many materials, surfaces and objects in general provide multifunctionality. Biologically inspired materials and surfaces have generated significant interest and are helping to shape green science and technology [1].

The major emphasis on nanoscience and nanotechnology since the early 1990s has provided a significant impetus in mimicking nature using nanofabrication techniques for commercial applications. Biomimetics has spurred interest across many disciplines. It was estimated that annual revenues from bioinspired products in 2015 was several billion US dollars. Annual sales are expected to continue to increase dramatically. The field is still emerging and this theme issue will help summarize the many recent developments.

The theme issue focuses on superliquiphobic, superliquiphilic and low-drag surfaces, and is coherent,

covering the breadth of the field. In addition, a comprehensive review of bioinspired surfaces for water supply and management is introduced. Water stress, scarcity and potability are significant global concerns, and bioinspired surfaces may hold a key to alleviating these concerns. All papers have an overview along with new research data and future outlook to identify where the field is going. For the first time in a journal, such comprehensive reviews, as well as new information, is available in one place for both experts and others new to the field, as well as those who are not active in the field, but may contribute significantly. It will serve as a resource for practitioners and society at large.

In this issue, various fields are brought together. Biology, as it applies to the use and examination of nature for purposes of biomimetics; chemistry, as it relates to the understanding of coatings and interactions for purposes of surface treatments derived from living nature; engineering, as it relates to the generation of devices and applications for purposes of bringing materials and surfaces derived from living nature together; materials science, as it relates to the generation of new and unique materials inspired by those found in living nature; nanomanufacturing, as it relates to new techniques and processes of generating surfaces and materials; and art and architecture, as they relate to the field of biomimetics as a whole.

The authors are internationally recognized in their respective fields. The editor thanks the authors for their great and timely contributions.

References

1. Bhushan B. 2016 *Biomimetics: bioinspired hierarchical-structured surfaces for green science and technology*, 2nd edn. Berlin, Germany: Springer.