Designing Biomimetic Surfaces as Facilitator for a Cleaner Environment

Hendrik Hölscher[1,*]

[1.] Institute of Microstructure Technology (IMT) at the Karlsruhe Institute of Technology, Karlsruhe, Germany
* Corresponding author: hendrik.hoelscher@kit.edu

Many nano- and microstructures found in nature feature fascinating properties and frequently, they are archetypes for the design of technical solutions. Such prototypes have high potential to lead to commercial solutions if it is possible to upscale their manufacturing. Here, I review our recent approaches to fabricating multi-functional surfaces with high potential for upscaling.

White beetles of the genus *Cyphochilus* are well-known for their scales producing a nearly perfect whiteness in a very efficient way with an astonishing low amount of material. Inspired by this biological architecture, we developed two techniques allowing for the fabrication of ultra-thin, yet highly scattering, white polymer films and particles [1,2]. Both approaches can be utilized for various applications ranging from extremely white but ultra-thin coatings to scattering particles as replacements for titanium dioxide [3,4].

Many snakes feature nano-scale fibril structures on their scales. They are only some 10 nm high and feature a periodicity of some µm. Although they cannot be observed in the visible range and the surfaces appear smooth to the naked eye, these nano-steps cause significant anisotropic frictional properties that are helpful for the locomotion of snakes [5]. These nano-step structures can be copied to artificial polymeric surfaces which can be utilized for the dry self-cleaning of photo-voltaic modules [6].

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