

## **Bionanotribology – Challenges, Development and Opportunities**

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Biomimetics deals with the identification of deep principles in biological materials, structures and processes and subsequent transfer of these principles to engineering, science and the arts. Velcro (inspired by fruits of a burdock), self-cleaning coatings (inspired by the lotus leaf) and dry adhesives (inspired by the gecko) reached the market very fast and demonstrate the high potential of proper abstraction of good design from nature. Biomimetic approaches are never just a blueprint of nature. Interdisciplinary approaches, unconventional ways of thinking and an open mind are prerequisites for good biomimetics. Challenges in bionanotribology comprise dealing with complex systems where small changes might result in huge, possibly adverse effects and the necessity to identify keystone properties with major influence on the tribosystem. Bionanotribology is developing fast; we are increasingly learning from nature's tribology. A new type of nanotribology is currently emerging, and collaborations with biologists are increasingly possible. New ways of scientific publishing and accessing human knowledge make such transdisciplinary approaches accessible to a wide range of those interested. Biomimetics is a design method and therefore not inherently sustainable; however, green and sustainable nanotribology are newly proposed concepts that come timely in age on the verge of the 6<sup>th</sup> mass destruction of species, this time not caused by natural catastrophies (such as the 5<sup>th</sup> one, 55 millions of years ago), but by our own industrialized societies. A smart combination of mechanical, energetic and chemical approaches, combined with optimum designed materials, and minimized stresses to the environment and biology, paves the way towards the future of bionanotribology. Successful tribologists are inherently transdisciplinary thinkers – this is needed in our increasingly complex world to successfully contribute to address major global challenges.