Nanotech Turns to Shark Skin and Dragonfly Wings

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"Our study looked at the special structure of the ribletted surfaces of some sharks which enables them to reduce drag and friction in fast-swimming sharks while also deterring microscopic marine organisms from adhering to their skin," says Flinders University Professor Youhong Tang, from the College of Science and Engineering.

"The shape of riblets on the skin surface influences the effectiveness of the drag reduction greatly, with the riblet surfaces performing best when aligned parallel to the flow direction."

Led by Chinese naval architecture and ocean design and engineering collaborators, the research is focusing on developing a simple biomimetic turbulent drag reduction topology on this shark skin-inspired research modelling.

This will be used to guide design of more fuel efficient marine surfaces, including cargo ships and pipelines, which also may not be as prone to attracting aquatic biofilm buildup which drags on shipping hulls.

Answers to leading scientific questions have been found in nature, with other Flinders University, La Trobe University and other researchers describing the potential of antibacterial powers of insect wings.

“The wings of dragonflies and cicadas have evolved to use the structural features of their surface to attain bactericidal properties,” says Flinders University researcher Dr Vi Khanh Truong, from the Flinders Biomedical Nanoengineering Laboratory.

“The nanopillars or nanospikes present on these natural materials physically damage the bacterial cells that settle on the nanostructures resulting in cell lysis and death.

“This study looks at these natural surfaces to provide guidelines for the design of synthetic bio-inspired materials and also create some novel fabrication techniques used to produce biomimetic micro- and nano-structures on synthetic material surfaces.”

It is estimated that infections due to antibiotic-resistant bacteria claim 700,000 lives each year. This is predicted to increase to 10 million by 2050 if drug-resistant bacteria continue evolving at the same rate.

Buildup of microbial biofilms on hospital and instrument surfaces and pose a significant challenge to human health as havens for infection-causing bacteria.

Scientists are developing antibacterial and antifouling materials to combat the increasing risk associated with bacterial infections and the evolution of drug-resistant bacteria by developing man-made coatings made from bactericidal agents such as metal derivatives or antibiotics.

Perhaps ‘nature knows best’ is the best option in some cases.

Read the original article on Scimex.