ME Seminar

PFAS-free slippery surfaces with mechanical flexibility

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ABSTRACT

There are numerous well-known and extensively studied examples of slippery surfaces in plants, such as lotus leaves, rose petals and pitcher plants, and in animals, including polar bear fur, shark skin and butterfly wings. However, these elegant natural systems have not evolved to meet the severe robustness requirements that practical engineered surfaces are often required to withstand.

In this presentation, I will focus on two strategies to address some of these limitations. First, I will demonstrate how mechanical flexibility can be exploited to enhance robustness. Second, I will show how pitcher-plant-inspired surfaces can be designed to withstand high-speed liquid impacts. These strategies could be instrumental in eliminating the use of poly- and perfluoroalkyl substances (PFAS) in slippery surface treatments, which pose major environmental and human health concerns. Emerging engineered surface examples based on reticular porous materials will be presented to demonstrate resilience to liquid impacts at speeds approaching those encountered in category five hurricanes.

ABOUT THE SPEAKER

Professor Tiwari is a Royal Society Wolfson Fellow and Professor of Nanoengineering in UCL Mechanical Engineering. He directs the Nanoengineered Systems Laboratory at UCL and serves on the Management Board of UCL Institute of Healthcare Engineering. His healthcare research is hosted by the UCL Hawkes Institute, and he is a member of the steering team of UCL's Manufacturing Futures Laboratory, a new centre dedicated to advanced materials and manufacturing technologies. His research has received four prestigious grants from the European Research Council (ERC). He advises two start-up companies, is on the Board of the Royal National Orthopaedic Hospital NHS Trust, Stanmore and is a member of the editorial teams of three international journals.

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