



# ME Seminar



## Nanoprecision interfaces in energy and healthcare

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### ABSTRACT

The engineering challenges of energy-efficiency, robustness, sustainability etc. are particularly acute at interfaces; nearly any failure starts at or creates new interfaces. Therefore, innovative engineering of surfaces and interface-integrated sensors elicits interest from a broad ranging of scientific community. In the first part of this presentation, I would like to discuss the need for precision and scalability in surface manufacture, with an emphasis on surfaces for anti-icing and other phase change control applications. I will also demonstrate how these surfaces could be useful for antimicrobial applications, thereby targeting the antimicrobial resistance (AMR) challenge. To continue the healthcare theme, in the second part, I will show a few examples of how nanoengineering is either already helping to or offers a strong promise to address these challenges. I would like to share a few latest developments in high-resolution 3D printing and bottom-up nanofabrication approaches we have introduced. This will start with example of miniature force/haptic sensors for new interventional sciences and surgical instruments. Materials considerations for self-powered, nanogenerator-based sensors will also be presented. Lastly, I will share some perspective on how surface nanoengineering and diagnostics technologies may need to evolve to meet future human healthcare and net zero considerations in infrastructure resilience, built environment and transport applications.

### ABOUT THE SPEAKER



Manish K Tiwari is Royal Society Wolfson Fellow and Professor of Nanoengineering in University College London. He directs Nano-engineered Systems Laboratory in UCL which includes chemists, physicists, applied mathematicians and engineers who work closely with collaborators from across the globe. Professor Tiwari has won a number of prestigious fellowships for research such as ERC Starting Grant, Royal Society Wolfson Fellowship and ERC Consolidator Grant. He is on the steering team of the Manufacturing Futures Lab, a new centre to be based in UCL EAST, which is a new campus and UCL's biggest expansion in its history. Professor Tiwari is also Director of Research in UCL Mechanical Engineering, curating department research strategy and helping to set future priorities. Additionally, he leads a healthcare research platform in the Wellcome/EPSRC centre for Interventional and Surgical Sciences (WEISS) that enables close collaboration between engineers and clinicians covering elements of sensing, robotics, imaging and artificial intelligence technologies. Professor Tiwari is on Honorary Editorial Advisory Board of International Journal of Heat and Mass Transfer and an Editor of the journal Experimental Heat Transfer.

**August 1, 2023 (Tuesday)  
4:00 PM, A R Auditorium**