USC Viterbi School of Engineering

Seminar

Ming Hsieh Department of Electrical and Computer Engineering

Atomic layer processing to optimize the performance of ultraviolet coatings and sensors

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Date: Thursday, February 20, 2025
Time: 10:00am – 11:15am
In-person: EEB 248

Abstract: The talk will describe the development of atomic layer deposition (ALD) and atomic layer etching (ALE) processes that utilize hydrogen fluoride as a co-reactant. At JPL this work has been motivated by the development of sensors and coatings operating in the far ultraviolet (λ = 90–200 nm) with an eye towards the emerging requirements of the Habitable Worlds Observatory, NASA's next astrophysics flagship mission of the 2030's. This talk will discuss the integration of these ALD/ALE coatings into two technologies at JPL: detector-integrated UV bandpass filters on silicon imaging sensors to enable solar- or visible-blind operation, and the demonstration of reflective aluminum mirror coatings protected by ALD fluorides. In both cases additional performance enhancement can also be obtained using novel atomic layer etching (ALE) processes to remove residual oxide contamination. Other applications of these processes in selective-area deposition, superconducting detectors, and lithium-ion batteries will be discussed.

Bio: John Hennessy is a microdevices engineer at NASA's Jet Propulsion Laboratory in the Advanced Detectors and Nanomaterials Group. His current research interests include the development of atomic layer deposition processes for optical and electrical applications related to UV detector-integrated filters, UV reflective coatings, and semiconductor surface passivation. He is currently the JPL institutional PI of the Caltech-led UVEX astrophysics mission, and the chair of the IEEE Metro LA Photonics Chapter. He received his BE and PhD degrees in electrical engineering from The Cooper Union in 2002, and the Massachusetts Institute of Technology in 2010. He is a recipient of the SPIE Rising Researcher Award in 2017 and a NASA Early Career Public Achievement Medal in 2020.