Materials Science & Engineering Seminar Series

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## Materials Science & Engineering

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# Resonant Infrared, Matrix-Assisted Pulsed Laser Evaporation: Enabling Hybrid Perovskite Thin Films for Optoelectronics

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**ABSTRACT**:
Hybrid perovskites with the ability to control spin, charge, and light could establish a new semiconductor technology that is especially useful for optoelectronic devices. While $CH_3NH_3PbI_3$ (methylammonium lead triiodide, or MAPbI) easily can be solution-processed, the same is not true for hybrid perovskites comprising larger, more complex organic molecules that have incompatible solubility with metal halides. Alternatively, vapor-phase deposition of organic precursors can introduce degradation and make stoichiometric deposition with inorganic precursors more difficult. However, resonant infrared, matrix-assisted pulsed laser evaporation (RIR-MAPLE), a versatile thin-film deposition technique that features aspects of both solution-based and vapor-phase deposition, enables a wide variety of hybrid perovskite thin films that can be difficult to achieve otherwise. This talk will review the development of RIR-MAPLE growth of hybrid perovskite thin films, demonstrating application to 3D MAPbI and 2D hybrid perovskites (such as oligothiophene- and phenethylammonium-based metal halide perovskites).

**BIOGRAPHY**:

Adrienne D. Stiff-Roberts is Jeffrey N. Vinik Professor in the Department of Electrical and Computer Engineering at Duke University, where she is also the Director of Graduate Studies for the University Program in Materials Science and Engineering. Her current research interests include organic and hybrid thin-film deposition by resonant-infrared matrix-assisted pulsed laser evaporation (RIR-MAPLE); materials characterization of organic and hybrid thin films; and the design, fabrication, and characterization of organic and hybrid optoelectronic devices, especially infrared photodetectors, photovoltaic solar cells, and multi-functional sensors. Dr. Stiff-Roberts received both the B.S. degree in physics from Spelman College and the B.E.E. degree in electrical engineering from the Georgia Institute of Technology in 1999. She received an M.S.E. in electrical engineering and a Ph.D. in applied physics in 2001 and 2004, respectively, from the University of Michigan, Ann Arbor. Dr. Stiff-Roberts is a recipient of the National Science Foundation CAREER Award (2006), the Office of Naval Research Young Investigator Award (2007), the IEEE Early Career Award in Nanotechnology of the Nanotechnology Council (2009), and the Presidential Early Career Award for Scientists and Engineers (2009).

**Doherty Hall 2210, 11:30AM**
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