

Achieving the Impossible by Harnessing Materials in a Novel Way



Adrienne Stiff-Roberts
Associate Professor, Electrical and Computer Engineering

CURRENT RESEARCH

Functional organic semiconductor and hybrid devices

Technologies society uses each day like photodetectors, solar cells, lasers, and sensors are dependent upon the morphology and interfaces of the constituent materials when deposited as a film. In other words, cell phones, breathalyzers, renewable energy, and countless other technologies are all dependent upon the fabrication and resulting interactions of some of their smallest parts. Dr. Adrienne Stiff-Roberts, Associate Professor of Electrical and Computer Engineering at Duke University, is developing a new thin-film deposition technique that has shown great promise in providing unprecedented control over organic-based materials. Her research is designed to understand the fundamental mechanisms and advantages of this technique, called emulsion-based, resonant infrared, matrix-assisted pulsed laser evaporation, or more simply, RIR-MAPLE. With RIR-MAPLE, she and her team will be able to remove the traditional limitations of solution-based processing, and furthermore, open up entirely new avenues for organic semiconductor devices and polymer-based films and surfaces, more generally.

By pioneering a novel approach to organic thin film deposition that combines solution and vacuum-processing, she and her team can provide many useful capabilities that are difficult, if not impossible, to achieve otherwise. Therefore, RIR-MAPLE offers a completely new way to integrate novel functions into films and devices with organic materials. As an example, organic solar cells have reached 12% efficiency, but are not yet practical for commercial application because the performance across a large solar panel is not consistent. Dr. Stiff-Roberts' thin-film deposition technique could help address this problem. In addition, RIR...

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AFFILIATION



Duke University

EDUCATION

- Ph.D., in Applied Physics, 2004 , University of Michigan
- M.S.E., in Electrical Engineering, 2001 , University of Michigan
- B.E.E., in Electrical Engineering, 1999 , Georgia Institute of Technology
- B.S., in Physics, 1999 , Spelman College

AWARDS

- 2008 Presidential Early Career Award for Scientists and Engineers (PECASE)
- Department of Defense, Office of Naval Research, 2009
- IEEE Early Career Award in Nanotechnology of the Nanotechnology Council for "contributions to the development of nanoscale quantum dots for infrared detection", 2009
- Office of Naval Research Young Investigator Award, 2007
- National Science Foundation CAREER Award, 2006
- and 1 more...

RESEARCH AREAS

Technology, Electronics / Sensors, Materials Science / Physics, Nanotechnology

FUNDING REQUEST

Your contributions will support the continued research of Dr. Adrienne Stiff-Roberts, of Duke University, as she helps enable unprecedented control over organic thin films, including better uniformity and improved repeatability for organic semiconductor based devices. Donations will fund the necessary \$400-500K required for personnel, materials, supplies, shared facilities for materials characterization, equipment maintenance, publications, and travel. Join in research that provides many useful capabilities that are difficult, if not impossible, to achieve otherwise; support Dr. Stiff-Roberts.