UNIVERSITY OF RHODE ISLAND
Department of Chemistry
SEMINAR

Room 105 Beaupre Center
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Jay Foley

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"Tales of two resonators: Controlling optical energy flow with hybrid nanostructures"

HOST

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Tales of two resonators: Controlling optical energy flow with hybrid nanostructures

Abstract

The interaction between light and nanostructures can give rise to a number of different resonant phenomena, including plasmon resonances in metal nanoparticles, excitonic resonances in semiconductor nanoparticles, and scattering resonances in dielectric nanoparticles. An exciting feature of these resonant phenomena is that they provide opportunities to control the flow of optical energy at the nanoscale, a prospect which has important implications for renewable energy technologies among others. Creating hybrids of various nanoscale materials can often lead to new emergent phenomena, giving us yet more levers of control over light at the nanoscale. I will discuss two classes of hybrid nanostructures that give rise to emergent phenomena that show promise for energy conversion applications. The first class of hybrids includes multilayer planar nanomaterials whose emergent properties allow us to control how they radiate heat. The second class of hybrids consists of dielectric and metal nanospheres whose emergent properties offer new routes for light initiated energy transfer, including hot-carrier transfer and resonance energy transfer, to small molecules. I will describe ongoing efforts to develop simple but accurate theoretical and computational techniques to study and design these systems.