UNIVERSITY OF RHODE ISLAND
Department of Chemistry
VIRTUAL SEMINAR

2:00 PM, Friday October 30, 2020

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"The Influence of polymethyl methacrylate interfaces on the fluorescence of Rhodamine 6G thin films"

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The Influence of polymethyl methacrylate interfaces on the fluorescence of Rhodamine 6G thin films

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A three-layer fluorescence sensing platform is described. The sensor consists of an ultra-thin fluorophore layer of Rhodamine 6G (Rh6G) on top of a sub-micron polymer film of polymethyl methacrylate (PMMA) on top of a rigid glass support. Both fluorophore and polymer layers are prepared by spin-coating, a common industrial process for repeatable deposition of thin films of uniform thickness. First, we study the preparation of PMMA films. Using an accepted equation of state, we closely examine spin-coating dynamics and show that casting solution concentration and spin speed process parameters can be used to modulate the final thickness and surface morphology of dry PMMA films. Then, we apply the fluorophore layer. Using absorbance, excitation, and emission spectroscopy, we study the photophysics of Rh6G and demonstrate that interfacial roughness can help enhance fluorescence by disrupting the formation of weakly emissive dimer and aggregate absorbing species. Additionally, light trapping within the dielectric polymer layer can enhance fluorescence by promoting photon re-absorption at the polymer-fluorophore interface.