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Measuring Quantum Efficiency of Organic Dyes Encapsulated in Dielectric NanoSpheres TIMOTHY RUSSIN, Department of Physics, The Pennsylvania State University, ERHAN ALTINOGLU, JAMES ADAIR, Department of Materials Science and Engeering, The Pennsylvania State University, PETER EKLUND, Department of Physics, Department of Materials Science and Engeering, The Pennsylvania State University — We present results of a fluorescent quantum efficiency (Φ) study on the encapsulation of the near infrared dye indocyanine green (ICG) in calcium phosphate (CP) nanoparticles (dia$\sim$50 nm). The quantum efficiency (Φ, described as the ratio of photons emitted to photons absorbed) provides a quantitative means of describing the fluorescence of an arbitrary molecule. However, standard quantum efficiency measurement techniques provide only Φ of the smallest fluorescing unit – in the case of a nanoparticle suspension, the nanoparticle itself. This presents a problem in accurately describing the quantum efficiency of fluorophores embedded in a nanoparticle. We have developed a method to determine the quantum efficiency of the constituent fluorescent molecules embedded in such a nanoparticle, which provides a more meaningful comparison with the unencapsulated fluorophore. While applicable to generic systems, we present results obtained by our method for the ICG/CP nanoparticles in phosphate buffer solution, revealing a dramatic improvement in per-molecule Φ driven by encapsulation.

Timothy Russin
Department of Physics, The Pennsylvania State University

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