Abstract Submitted
for the SES08 Meeting of
The American Physical Society

Nanoscale Effects on the Optical Performance of Nanofiber-Quantum Dot Nanocomposites TERI WALKER, LYNN DAVIS, HOWARD WALLS, LI HAN, JENIA TUFTS, DAVID ENSOR, Research Triangle Institute — Photoluminescent nanofibers (PLNs) can be created by combining nanofibers and quantum dots using the process of electrospinning. The physical properties of PLNs are dependent upon many different parameters associated with both the nanofiber and the quantum dot and their interactions. By understanding and manipulating these properties, the performance of the resulting optical structure can be tailored for desired end-use applications. For example, the transmittance and reflectance of nanofiber substrates is controlled by factors such as refractive index, thickness, fiber diameter and density, and surface morphology. Likewise, the quantum efficiency of the quantum dots in PLNs depends upon multiple parameters including quantum dot chemistry, method of forming the PLN nanocomposite, and prevention of quantum dot agglomeration. Methods to optimize the performance of PLNs are discussed along with guidelines for tailoring the performance of nanofibers and quantum dots for application specific requirements..

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Date submitted: 15 Aug 2008 Electronic form version 1.4