Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Cyto-molecular Tuning of Quantum Dots[1] BONG LEE, Dept of Physics, Creighton University, SINDHUJA SURESH, Dept of Computer Science, Creighton University, ANDREW EKPENYONG, Dept of Physics, Creighton University — Quantum dots (QDs) are semiconductor nanoparticles composed of groups II–VI or III–V elements, with physical dimensions smaller than the exciton Bohr radius, and between 1-10 nm. Their applications and promising myriad applications in photovoltaic cells, biomedical imaging, targeted drug delivery, quantum computing, etc, have led to much research on their interactions with other systems. For biological systems, research has focused on biocompatibility and cytotoxicity of QDs in the context of imaging/therapy. However, there is a paucity of work on how biological systems might be used to tune QDs. Here, we hypothesize that the photo-electronic properties of QDs can be tuned by biological macromolecules following controlled changes in cellular activities. Using CdSe/ZnS core-shell QDs, we perform spectroscopic analysis of optically excited colloidal QDs with and without promyelocytic HL60 cells. Preliminary results show shifts in the emission spectra of the colloidal dispersions with and without cells. We will present results for activated HL60-derived cells where specific macromolecules produced by these cells perturb the electric dipole moments of the excited QDs and the associated electric fields, in ways that constitute what we describe as cyto-molecular tuning.

[1]Startup funds from the College of Arts and Sciences, Creighton University (to AEE).

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Date submitted: 11 Nov 2016 Electronic form version 1.4