Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Spectrally Uniform Quantum Dot Single Photon Emitter Array for Integrated Nanophotonics: Electronic Structure and Optical Properties[1] JIEFEI ZHANG, Dept of Physics and Astronomy, University of Southern California, SWARNABHA CHATTARAJ, Dept of Electrical Engineering, University of Southern California, SIYUAN LU, IBM Thomas J. Watson Research Center, Yorktown Heights, ANUPAM MADHUKAR, Department of Chemical Engineering and Materials Science, University of Southern California — Recently we proposed a new paradigm for nanophotonic quantum information processing(QIP) systems comprising on-chip single quantum dots (SQD) as single photon source (SPS) array integrated with light manipulating elements(LME) [1]. To this end we demonstrated an ordered array of spectrally uniform InGaAs mesa top SQDs (MT-SQD) as on-chip SPSs [1, 2] that have spectral uniformity an order of magnitude better than traditional island QDs and show triggered single photon emission at 77.4K. In this talk we will present low temperature photoluminescence (PL) and PL excitation studies showing that the first excited states are, for electrons and heavy holes, respectively ˜40meV and ˜10meV from the ground states. Thermally mediated carrier escape to the first excited states is revealed from temperature dependent PL. Additionally, results on low temperature and polarization dependent single photon emission ($g^{(2)}(0)$) will be reported. Such MTSQD arrays, after a planarizing overgrowth, are ideally suited for monolithic integration with appropriate LMEs for applications towards on-chip QIP systems. [1] J. Zhang et.al, arXiv:1609.00068 (2016). [2] J. Zhang et.al., Jour. Vac. Sc. Tech. B32, 02C106 (2014).

[1]This work is supported by ARO grant number W911NF-15-1-0298.

Swarnabha Chattaraj
Univ of Southern California

Date submitted: 11 Nov 2016 Electronic form version 1.4