Abstract Submitted
for the GEC07 Meeting of
The American Physical Society

Student Excellence Award Finalist: Binary quantum dot arrays: A plasma-based deterministic approach AMANDA RIDER, KOSTYA (KEN) OSTRIKOV, Plasma Nanoscience, The University of Sydney — Fabrication of size-uniform, compositionally controlled binary quantum dot (QD) [1] arrays is of great interest to the multidisciplinary research community. The increasing number of QD applications in fields ranging from biology to optoelectronics - each with precise structural requirements, necessitates that a more rigorous approach to fabrication be adopted. Conventional fabrication techniques are unable to cope with the myriad requirements for highly tailored QDs. In this paper, emphasis is placed on plasma-related effects such as substrate heating, surface activation energy and the benefits of low-temperature growth offered by thermally non-equilibrium, low-temperature plasma routes. The competitive edge in using plasmas as versatile nanofabrication tools is examined via a comprehensive analysis of available experimental results and numerical simulation of the deterministic plasma-assisted nanofabrication of compositionally controlled, size-uniform QD arrays. The commercial potential of a plasma-based approach compared to common fabrication techniques such as thermal chemical vapor deposition (CVD) and molecular beam epitaxy (MBE) is explored, as is the application of plasma grown QDs in novel biosensors and third generation solar cells. [1] A. E. Rider et al, J. Appl. Phys. 101, 044306 (2007); I. Levchenko, A. E. Rider, K. Ostrikov, Appl. Phys. Lett. 90, 193110 (2007).

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Date submitted: 21 Aug 2007 Electronic form version 1.4