

Abstract Submitted  
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**Nonlinear Optical Spectroscopy of Silicon Nanocrystals Embedded in Silica**<sup>1</sup> AARON ROBERTS, JUNWEI WEI, MICHAEL DOWNER, University of Texas at Austin — Light-emitting Silicon nanocrystals (Si NCs) embedded in silica are attracting much attention for their potential applications in silicon photonics. However, the relative contributions of the crystalline Si (c-Si) bulk and the nano-interfacial transition region to the photoluminescence remain controversial. Moreover, the micro-structure of the nano- interface separating the c-Si core from the amorphous silica matrix has proven difficult to characterize experimentally. Presented here are results from second harmonic generation spectroscopy and complementary spectroscopic-ellipsometric and micro-Raman measurements of Si NCs of different sizes. Spectroscopy results confirm the preservation of the basic electronic properties of bulk c-Si through the appearance of the E1 and E2 critical point resonances. However, they also demonstrate the existence of an intermediate resonance between E1 and E2 consistent with an amorphous Si nano-interfacial transition region that thins with increasing NC diameter.

[1] J. Wei et al., submitted to Phys. Rev. B (2011).

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Aaron Roberts  
University of Texas at Austin

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