Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Two types of luminescence blinking revealed by spectroelectrochemistry of single quantum dots[1] CHRISTOPHE GALLAND, YAGNASENI GHOSH, ANDREA STEINBRUECK, MILAN SYKORA, JENNIFER HOLLINGSWORTH, VICTOR KLIMOV, HAN HTOON, Los Alamos National Laboratory — The phenomenon of fluorescence intermittency (blinking between ON/OFF states) has been observed for both naturally occurring fluorophores and artificial nanostructures. This study aims to resolve the long-standing controversy surrounding the origin of photoluminescence blinking in core/shell nanocrystal quantum dots. Researchers usually evoke the Auger, or A-type, mechanism in which photo-ionization of the dot leads to the OFF state, but recent observations have raised doubts about this explanation. Here we report time-resolved photoluminescence studies of individual nanocrystal quantum dots performed while electrochemically controlling the degree of their charging [1]. We find that a second mechanism (called B-type) is the dominant cause for blinking. During B-type blinking, a photoexcited, "hot" electron is trapped in a surface state before being released to the core; the luminescence is quenched without any Auger process. By controlling the applied potential and the shell thickness, we can control the frequency and type of blinking, or suppress it completely.

[1] Galland *et al.*, Nature **479**, 203-207 (2011).

[1]C.G. and V.I.K. acknowledge support of the Center for Advanced Solar Photophysics, an Energy Frontier Research Center funded by the US Department of Energy (DOE), Office of Science, Office of Basic Energy Sciences (BES).

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Date submitted: 14 Nov 2011 Electronic form version 1.4