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Memory Effects in CdSe Nanocrystal Quantum Dots MICHAEL FISCHBEIN, ARIF SHILIWALA, MARIJA DRNDIC, Department of Physics and Astronomy, University of Pennsylvania — Memory effects in the charge transport in arrays of CdSe nanocrystals have been observed and characterized. These semi-conducting colloidal quantum dots have previously been shown to demonstrate a non-steady state current transient response to the application of a constant negative source-drain voltage bias. In this study we have shown that CdSe nanocrystals display memory of the voltage pulses applied to them. In particular, for a sequence of two negative voltage pulses, the nanocrystals' response to the second pulse will be dependent on the value and duration of the first pulse. We define the first voltage pulse as the “write” step and the second voltage pulse as the “read” step. To probe the programmability of the nanocrystals, a range of different write steps were performed and the current transients generated by the read steps were characterized. We have demonstrated the ability to undo the effect of the write steps by either shining band gap light on the nanocrystals or by applying a positive voltage bias; such events are naturally defined as “erase” steps. The full write-read-erase cycle demonstrates the potential for the application of CdSe nanocrystals to memory technology and offers new information on the charge transport. * This work is supported by the ONR Young Investigator Award # N000140410489, the American Chemical Society PRF award, and the startup funds at Penn. MF acknowledges funding from the NSF IGERT Program.

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