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Optical Properties of PbSe Nanowires E. CLIFTON, J.G. TISCHLER, E.E. FOOS, T.J. ZEGA, R.M. STROUD, J.E. BOERCKER, C.D. CRESS, AL L. EFROS, S.C. ERWIN, Naval Research Laboratory — Colloidal PbSe nanocrystals show potential as a material for high efficiency photovoltaics, for two reasons: (1) tunability of the band gap through a wide range in the near infrared, and (2) efficient multiexciton generation. The charge mobility of PbSe NCs is relatively high compared to other nanocrystalline materials, but is still far from optimal. One possible way to increase the mobility is to use nanowires instead of nanocrystals. To this end we have synthesized high-aspect-ratio (>100) PbSe nanowires in solution. Here we investigate the optical properties of these nanowires using photoluminescence and transmission. We observe clear quantum confinement, and demonstrate that the bandgap can be tuned over the range required, ∼0.4eV, for photovoltaic applications [1]. Finally, we investigate the evolution of quantum confinement when going from 0D to 1D by comparing the optical properties of nanocrystals and nanowires. [1] Schaller et al., Nanoletters 6, 424(2006)

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