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Temperature dependent luminescence study of quantum-confined EuS nanocrystals SUSEELA SOMARAJAN, MELISSA HARRISON, DMITRY KOKTYSH, HE WEIDONG, JAMES DICKERSON, Vanderbilt University — Europium sulfide (EuS) has been investigated extensively in its bulk forms for its interesting magnetic and magneto-optical properties. Enhanced physical properties of EuS nanocrystals resulted from the combined contributions of surface strain phenomena, high surface to volume ratio, and strong quantum confinement. Here we present the optical properties of EuS nanocrystals, synthesized using a novel colloidal synthetic procedure. To our knowledge, this would be the first temperature dependent luminescence study of EuS nanocrystals. Monodisperse single crystalline EuS nanoparticles were synthesized by solvothermolysis in a size-controlled manner from respective precursors. Structural properties were characterized by transmission electron microscopy (TEM), selected area electron diffraction (SAED), and X-ray diffraction (XRD). Optical absorption and temperature dependent photoluminescence (PL) techniques were used to investigate the energy band gaps of EuS nanocrystals of different sizes. Luminescence characteristics of EuS are due to the 5d $\rightarrow$ 4f7 relaxation (4f6 $\rightarrow$ 5d transitions) of Eu2+. Based on the temperature dependent photoluminescence studies, the characteristics and origins of the band-edge luminescence of EuS nanocrystals with different sizes will be discussed.

Suseela Somarajan
Vanderbilt University

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