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Investigation of Mn Dopant Induced Electronic Band Structure Widening in PbS Quantum Dot Thin Films. ARTEM PIMACHEV, ANDREW YOST, GAURAB RIMAL, JINKE TANG, YURI DAHNOVSKY, TEYU CHIEN, Univ of Wyoming — A thorough understanding of the phenomena associated with doping of transition metals in semiconductors is important for the development of semiconducting electronic technologies. Furthermore, understanding the electronic interactions of TM dopants in dilute magnetic semiconductors can provide insight into magnetic phenomena. Here we present STM and spectroscopy studies of the effects of Mn doping on the energy band structures of PbS semiconducting QD thin films. As a result of Mn doping, an increase of the electronic band gap was observed. Furthermore two distinct contrasts in dI/dV mapping were discovered and it is argued through the use of DFT calculations that these are due to the type of doping mechanism, either substitutional or interstitial. We also found the dependence on the location of the Mn atoms, either on the surface or inside the thin film, and on the magnetic spin orientation.

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