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**Mn Doping Effects on the Electronic Band Structure of PbS  
Quantum Dot Thin Films: A Scanning Tunneling Microscopy Analysis<sup>1</sup>**

ANDREW J. YOST, GAURAB RIMAL, JINKE TANG, TEYU CHIEN, University 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 such as semiconducting quantum dot sensitized solar cells (QDSSC). Manganese doping is of particular interest in a PbS QD as it is potentially capable of increasing overall QDSSC performance [1]. Here we present scanning tunneling microscopy and spectroscopy studies about the effects of Manganese doping on the energy band structures of PbS semiconducting QD thin films, grown using pulsed laser deposition. As a result of Manganese doping in the PbS QD thin films, a widening of the electronic band gap was observed, which is responsible for the observed increase in resistivity. Furthermore, a loss of long range periodicity observed by XRD, upon incorporation of Manganese, indicates that the Manganese dopants also induce a large amount of grain boundaries. [1] Qilin Dai *et al.*, APL 104,183901(2014).

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