

Size-controlled synthesis of monodispersed Quantum dot (QD) NiO

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Nickel oxide (NiO) is a widely used inorganic p-type semiconductor with a large bandgap (Eg) and deep valence band (VB) that aligns well with the highest occupied molecular orbital (HOMO) levels of many p-type organic semiconductors. Quantum dot NiO has unique electrical and optical characteristics, which includes increase electrical performance, low production cost and bandgap tuning. In this work, size-controlled monodispersed QD-NiO was synthesized by the reduction of nickel (II) acetylacetonate with the borane-triethylamine complex in a mixture of oleylamine. For NiO synthesis oleylamine act as a capping agent and it helps to reduce the particle size growth. Quantum dot nickel oxide has been characterized by XRD, FE-SEM, HR-TEM, EDAX, UV-Vis absorption, Photoluminescence (PL), XPS, BET, and Raman spectroscopy techniques. The X-ray diffraction pattern and HR-TEM studies revealed the crystallinity and the size of the resultant QDs were determined around 6 nm. This material is applicable to various areas of research such as sensors, solar cells, catalyst, battery materials, active optical fibers and light emitting diodes.