

OPTICAL SENSING OF ENVIRONMENTALLY HAZARDOUS HEAVY METALS (Cr^{3+} , Pb^{2+} , Zn^{2+}) AND CANCER CELLS BY FUNCTIONALIZED CORE/SHELL QUANTUM DOTS

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Over the last few years, confined nanometric systems such as quantum wells, quantum wires and quantum dots (QDs) etc. have become most fascinating and promising research fields in view of their tremendous applications environmental safety [1]. When organic/inorganic material reduces to nano size, their electronic and optical properties drastically change from their bulk form. QDs are such nanocrystals. There are two main categories of QD: core type QDs and core-shell type QDs. Core-shell type QDs show less surface defects, enhanced luminescence efficiencies, photo stability and less toxicity compared to that of core type QDs. CdSeS/ZnS is one of such Core/shell type QD which shows all of the above mentioned advantages over its core structure CdSeS. Optical properties mainly high fluorescence with large quantum yield (QY) (up to 85%) Development of industries generates numerous heavy metal wastes that can cause direct or indirect harm to the environment and humans. Many hazardous heavy metals, such as copper (Cu), chromium (Cr), lead (Pb), zinc (Zn), nickel (Ni), iron (Fe), cadmium (Cd), mercury (Hg), tungsten (W) and silver (Ag) are toxic to living organism [2]. High percentage of Cr and Pb ions within a living organism may lead to various diseases, such as hypersensitivity, lung cancer, nasal cancer, and many other types of cancer. Therefore, the detections of hazardous metal ions like Cr, Zn and Pb are our prime focus. In the present work, we have synthesized functionalized CdSeS/ZnS core shell QDs using L-glutathione (L-GSH) in view of their application to detect hazardous metal ions and some cancer affected diseased cells. The surface modification of QDs with L-GSH make them available for interaction with the targeted materials, which can be used for the detection of hazardous ions and diseased cells present in water. Prepared functionalized CdSeS/ZnS QDs were characterized and tested with the help of several molecular spectroscopic techniques (UV-Vis spectroscopy and fluorescence spectroscopy) by their fluorescence signals. The present work opens a door to the study of new water soluble and biocompatible QDs by the use of their fluorescence sensing for the detection of hazardous metal ions and living cancer cells. References: [1] M. Ishikawa, V. Biju, Prog. Mol. Transl. Sci., 104 (2011) 53. [2] N. Singla, A. Tripathi, M. Rana, S. K. Goswami, A. Pathak, P. Chowdhury, J of Luminescence, 165 (2015) 46-55.