World Academy of Science, Engineering and Technology
International Journal of Energy and Environmental Engineering
Vol:9, No:05, 2015

Rapid Microwave-Enhanced Process for Synthesis of CdSe Quantum Dots for Large Scale Production and Manipulation of Optical Properties

Authors : Delele Worku Ayele, Bing-Joe Hwang

Abstract : A method that does not employ hot injection techniques has been developed for the size-tunable synthesis of high-quality CdSe quantum dots (QDs) with a zinc blende structure. In this environmentally benign synthetic route, which uses relatively less toxic precursors, solvents, and capping ligands, CdSe QDs that absorb visible light are obtained. The size of the as-prepared CdSe QDs and, thus, their optical properties can be manipulated by changing the microwave reaction conditions. The QDs are characterized by XRD, TEM, UV-vis, FTIR, time-resolved fluorescence spectroscopy, and fluorescence spectrophotometry. In this approach, the reaction is conducted in open air and at a much lower temperature than in hot injection techniques. The use of microwaves in this process allows for a highly reproducible and effective synthesis protocol that is fully adaptable for mass production and can be easily employed to synthesize a variety of semiconductor QDs with the desired properties. The possible application of the as-prepared CdSe QDs has been also assessed using deposition on TiO2 films.

Keywords : CdSe QDs, Na2SeSO3, microwave (MW), oleic acid, mass production, average life time
Conference Title : ICSREE 2015 : International Conference on Sustainable and Renewable Energy Engineering
Conference Location : Montreal, Canada
Conference Dates : May 11-12, 2015