Semiconductor nanocrystals as functional materials for nanoelectronics

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Semiconductor nanocrystals exhibit exciting and interesting properties as they transition from bulk to the nanoscale. The emergence of new properties is as a result of quantum confinement effects. Semiconductor nanocrystals are attractive materials for use in photovoltaic devices mainly due to their tunable absorption spectrum, large surface area (because of their small size), their adaptability, their ability to generate multiple excitons as well as their capability of hot carrier injection from excited state i.e. by minimizing energy losses during the thermalization of excited state. Semiconductor nanocrystal solar cells are projected to achieve higher efficiencies than silicon based solar cells while reducing the cost of each kilowatt of electricity produced, the raw materials and the processes used to convert the raw materials into functional cells. Semiconductor nanocrystals based gas sensors show much promise as they can detect analytes at low concentration due to the large surface area, can be highly selective as the result of the carrier type and have been shown to operate at room temperature thus reducing the costs. Herein, we report on the synthesis and characterization of various types of metal chalcogenide semiconductor nanocrystals and showcase their versatility through application in both solar cells and gas sensors.

Speaker Biography

Makwena Justice Moloto has completed his PhD at the age of 30 years from the University of Zululand and spends time at the University of Manchester to complete his PhD hosted by school of chemistry. He is the researcher at one of the technically orientated university in the department of chemistry. He has published more than 40 papers in reputed journals and has been serving as a reviewer for a number of materials chemistry journals of repute.

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