Overview of Research Work and List of Publications of Dr. Jhasaketan Nayak

Dr. Jhasaketan Nayak (myself) has been working as one of the faculty members in the Department of Physics in Indian Institute of technology (Indian School of Mines) Dhanbad (IIT(ISM) Dhanbad), India since 26th August 2013.

Currently, our research group consists of three PhD research scholars and two master students. These days, our research is focused on nanostructured metal oxide semiconductors and ceramic materials for applications in UV-Vis photocatalysts and sensors.

These days, our research is focused on fabrication of sensor devices using metal oxide semiconductor nanocrystals [1]. Our recent results show that WO_3/CdS nanocomposites can act as efficient glucose sensor under visible light illumination [2]. Optical properties of CdS: Zn has been studied for application in photovoltaic sensors [3].

Earlier, we synthesize $CaCu_3Ti_4O_{12}$ and HfO_2 nanoparticles by chemical techniques and research their gas sensing properties. We observed a very strong response of the above nanomaterials towards the volatile organic compound gases such as acetone, ethanol and formaldehyde in room temperature ambiences [4–8].

Nanorods, nanoparticles and nanocomposites in form of free standing powders and self-assembled thin films have been extensively synthesized by our research group during recent years. Especially, metal oxide semiconductors such as TiO_2, ZnO, and CeO_2 have been synthesized by simple low cost chemical techniques. The above materials have been applied for visible light photocatalysis, ultraviolet light and humidity sensors and photo electrochemical solar cells [9–17].

Prior to joining IIT (ISM) Dhanbad, Dr. J. Nayak worked as a special researcher in the department of Electrical Engineering (Prof. Heeje Kim's laboratory) at Pusan National University, Busan, South Korea from September 2010 to August 2013 where he synthesized TiO_2 nanorods and ZnO/CdS composites for applications in dye sensitized solar cells and quantum dot sensitized solar cells [18–22].

During February 2009 to August 2010, Dr. J. Nayak worked as assistant professor (on contract) in Department of Physics & Meteorology at Indian Institute of Technology Kharagpur, India where he synthesized ZnO/CdS nanocomposites for visible light photocatalysis. [23].

From March 2008 to February 2009, Dr. J. Nayak worked as a postdoctoral researcher in the department of Chemical Engineering (Prof. Kijung Yong's laboratory) at Pohang University of Science & Technology (POSTECH), Busan, South Korea where he synthesized Copper Indium Gallium Selenide nanoparticles for applications in solar cells.

During November 2004 to February 2008, Dr. J. Nayak worked as a postdoctoral researcher in the department of Electrical Engineering (Prof. Shinji Nozaki's laboratory) at University of Electro-communications, Tokyo, Japan where he synthesized ZnO nanoparticles for white light emitting diodes. The visible photoluminescence in the blue-yellow region was observed from ZnO nanopowder and it was significantly enhanced by co-doping with aluminum and lithium [24–28].

As a research scholar, Mr. J. Nayak deposited nanostructured GaAs thin films on transparent conducting oxide substrates such as ITO/FTO coated glass sheets in Prof. S.N. Sahu's laboratory at Institute of Physics, Bhubaneswar, India for applications in solar cells [29–38].

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