



## Plasmonic Au-ZnO composite: Advancements and future challenges

S. Girish Kumar

CMR University, Bagaluru, Karnataka, INDIA.

### Abstract:

The metal-semiconductor composite structure mediated photocatalytic reactions has been regarded as promising approach, because of their multifaceted functionalities attained due to the synergistic interactions at the interface of integrated components. The surface Plasmon resonance of Au NPs and superior photocatalytic properties of ZnO makes Au-ZnO as a prime choice the degradation of various pollutants and also for the hydrogen evolution reaction under diverse reaction conditions. In this presentation, choice of Au over other noble metals, preparative methods, band offsets between ZnO and Au, core@shell structures, and mechanisms of photocatalytic reactions associated with Au-ZnO will be discussed in detail. The merits and demerits associated with the deposition method of Au and site specific deposition of Au over the ZnO surface will be highlighted. Further progress achieved in Au-ZnO through modifications with organic functional groups that facilitate the formation of stable composite will be emphasized. In addition, ternary composites of Au-ZnO accomplished by heterostructuring with metals, carbon materials and other semiconductors are discussed by emphasizing on the preparation methods and charge carrier dynamics. This presentation provides sufficient information about the design and development of multifunctional Au-ZnO heterostructure concerning the visible light harvesting ability, charge carrier separation and interface engineering which can be explored in energy and environment applications.

### Biography:

Dr. S.Girish Kumar Completed Ph.D degree (2012) from Department of Chemistry, Bangalore University, Bangalore and completed his post-doctoral studies (D. S. Kothari Post-Doctoral Fellowship August 2012 – August 2015) under the supervision of Prof. K. S. R. Koteswara Rao at Department of Physics, Indian Institute of Sci-



ence, Bangalore. Also, he have served as Instructor for Undergraduate Research Programme (Chemistry Discipline) at Indian Institute of Science, Bangalore, INDIA. At present He is working as Assistant Professor at Department of Chemistry, CMR University.

### Publication of speakers:

- S. Girish Kumar et al; Nanomaterial assisted bulk scale synthesis of 2-methyl-6-nitroquinoline, 2020 Aug 9.
- S. Girish Kumar et al; Photo degradation of methyl orange an azo dye by advanced Fenton process using zero valent metallic iron: influence of various reaction parameters and its degradation mechanism, 2008 Aug 15.
- S. Girish Kumar et al; Heterogeneous photo catalytic degradation of anionic and cationic dyes over TiO(2) and TiO(2) doped with Mo(6+) ions under solar light: Correlation of dye structure and its adsorptive tendency on the degradation rate, 2009 May 12.
- S. Girish Kumar et al; Copper nanoclusters: an efficient fluorescence sensing platform for quinoline yellow, 2019 Feb 11.
- S. Girish Kumar et al; Zinc Oxide Nanostructures for NO<sub>2</sub> Gas-Sensor Applications: A Review, 2014 Dec 16.

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