Dr. Nirmalya Ballav

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Introduction to speaker:

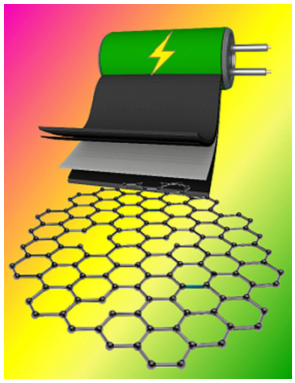
Dr. Nirmalaya Ballav is currently Associate Professor of Chemistry at Indian Institute of Science Education and Research (IISER) Pune, India and a visiting scientist at laboratory for Micro and Nanotechnology at Paul Scherrer Institute (PSI), Zurich, Switzerland. He did his M.Sc. in Organic Chemistry and Ph.D in Physical Chemistry from University of Calcutta. He has worked as post-doctoral fellow at University of Heidelberg, Germany and as a Senior-Post-Doctoral Fellow at Paul Scherrer Institute (ETH Domain), Switzerland. His major research interests are; Interfacial Materials Chemistry: Fundamentals and Applications. He is the recipient of ChemComm Emerging Investigator, UK (2014), DAE-Young Scientist Research Award India (2012) and the Holcim Fellowship 2010, Switzerland. He is on the Editorial Board of Journal Editorial Board Member of the Journal - ISRN Spectroscopy and has about 100 journal publications. He and his team were one of the top five finalist at the Gerhard Ertl Young Investigator Award (top-five finalist) 2011, Germany.

Title:

"Chemically Derived Reduced Graphene Oxide for Energy Applications"

Abstract:

Graphene-based materials are emerging in the development of energy devices, specifically for commercial supercapacitor. Recently, we have introduced transition metal salts as effective reducing agents for the chemical reduction of graphene oxide (GO) whereby semiconducting reduced graphene oxide (rGO) materials with various morphological patterns (two-dimensional nanosheet and three-dimensional mesoporous structures) are isolated.[1,2] The fabricated all-solid-state supercapacitor of as-synthesized rGO exhibited significantly higher specific capacitance (>300 F/g at 1 A/g), remarkable cycling stability (>80% retention of capacitance beyond 100,000 continued charge-discharge cycles), and flexibility (>500 bending cycles), which are overall comparatively much better than those of rGO derived from conventional reducing agents like $NaBH_4$ and N_2H_4. Use of organic electrolyte further boosted the supercapacitor performance. Our work opens up new possibilities for the production of rGO on an industrial scale satisfying the needs of high-performance energy-storage devices. Introducing an interfacial layer of rGO in dye sensitized solar cell, we are also being able to significantly enhance the efficiency.



References:

1. P. K. Jha and N. Ballav, Complete Filing of Indian Patent (Application No. 201621023063).

2. P. K. Jha, S. K. Singh, V. Kumar, S. Rana, S. Kurungot, and N. Ballav, Chem 3 (2017), 846