National Institute of Technology Rourkela

Synopsis Seminar

Seminar Title	: Graphene oxide based ternary hybrid nanocatalyst for photocatalytic environmental remediation
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Venue	: Seminar Room, Dept. of Chemistry
Date and Time	: 29 May 2024 (10.30 AM)
Abstract	: The rapid growth of the global population and the advent of modern industrialization have placed the world at risk of experiencing a significant surge in environmental pollution. Consequently, there is an urgent need for sustainable sources of clean energy and clean water on a global scale. This pressing need has sparked considerable interest in the development of alternative approaches to achieve these objectives. Among the various techniques commonly employed for environmental cleanup, visible light-responsive photocatalysis based on semiconductors has garnered widespread attention as a promising green tool capable of efficiently degrading toxic pollutants into sustainable products. Therefore, this thesis endeavors to investigate the synthesis and photocatalytic application of diverse graphene oxide (GO) based ternary hybrid nanocatalysts, which can be utilized for visible light-induced photocatalytic environmental remediation. These GO-based materials are subsequently integrated with metal oxide, mixed metal oxide, and other nanostructures to fabricate ternary hybrid heterostructures. The prepared heterostructures exhibit enhanced optical absorption and improved photoelectrochemical features, rendering them highly suitable for various photocatalytic environmental remediation applications. We have deigned different ternary hybrid nanocatalyst, named hematite nanoparticles decorated nitrogen-doped reduced graphene oxide/graphitic carbon nitride (NrGO/&*alpha*-Fe_2O_3/g-C_3N_4: NGCH), sulfur-doped reduced graphene oxide enwrapped magnetic porous nickel ferrite/copper sulfide (SrGO/$NiFe_2O_4$/CuS: GNFC), and$ZnBi_2O_4$/ZIF-67 derived hollow Co_3O_4 decorated reduced graphene oxide (rGO/$ZnBi_2O_4$/ZIF-Co_3O_4: ZCG) for the photocatalytic removal of various persistent organic and inorganic contaminants such as, Cr(VI), Nitrophenol, Dinitrophenol, Tetracycline hydrochloride, and Rhodamine B, as well as energy production from aqueous media under visible light irradiation. In summary, the research presented in this dissertation opens up new possibilities for energy and material-efficient nanocatalysis in the realm of photocatalytic environmental remediation applications utilizing GO-based nanohybrid materials.