Seminar

==========

Institute for Plasma Research

==========

Title: Graphene Oxide Incorporated, Post-Transition Metal Doped Zinc Oxide Thin Films and Nanorods for Efficient Dye Degradation

Speaker: Dr. John Paul
National Institute of Technology Tiruchirappalli, Tamil Nadu

Date: 21st March 2025 (Friday)

Time: 03.30 PM

Venue: Seminar Hall, IPR

Abstract

Pollution to water resources is one of the major challenges of industrialization and urbanization. Several techniques are employed for the remediation of polluted water. Photocatalysis is successfully employed to degrade methylene blue, an organic textile dye from aqueous solution. In this work pure zinc oxide thin film, graphene oxide incorporated zinc oxide thin films, metal doped zinc oxide thin films and their corresponding one-dimensional vertical nanorods were utilized as photocatalysts to degrade methylene blue dye in aqueous solution. Graphene oxide incorporated, post-transition metal doped zinc oxide thin films and nanorods were deposited using facile synthesis routes such as automated spray pyrolysis technique and aqueous chemical growth technique respectively.

Graphene oxide is introduced to enhance the photocatalytic activity of conventional zinc oxide thin film catalyst. Graphene oxide content in the precursor solution of zinc oxide varied from 0.0005 to 0.005 g/L. Further enhancement in the photodegradation parameters was achieved by doping the graphene oxide incorporated zinc oxide thin films with Aluminium, Gallium, and Indium. The effect of one dimensional nanorod growth on the photocatalytic activity of graphene oxide incorporated, transition metal doped thin films were also studied. Nanorod photocatalysts achieved higher degradation efficiencies than their corresponding thin films and the graphene oxide incorporated, indium doped zinc oxide nanorod has the highest degradation rate of 96.1%. Graphene oxide incorporated indium doped zinc oxide thin film catalyst exhibited a better degradation efficiency of 94.9% with the least reduction of 0.05%.