

## Departmental Seminar

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Seminar Title	: Removal of Toxic Imidacloprid by Graphene Oxide Derived from Indian Coal
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Supervisor	: Prof. Pradip Chowdhury
Venue	: Old seminar hall, Department of Chemical Engineering
Date and Time	: 24 Jan 2024 (11:00 AM)
Abstract	: Pesticide contamination is a severe risk to the environment and human health. Imidacloprid, a widely used neonicotinoid pesticide, has been detected in various environmental matrices, necessitating effective removal strategies. The purpose of this work is to determine whether graphene oxide (GO), which is produced from Indian coal, has any potential as an adsorbent for the removal of imidacloprid from aqueous solutions. SEM, PXRD, FT-IR, Raman, and BET surface area analyses were used to describe the synthesized GO and evaluate its structural and surface characteristics. The GO samples' nanoscale morphology was visible using SEM imaging, and EDX mapping revealed their heterogeneous composition with the presence of inorganic mineral impurities, including Si and Al. Powder XRD further demonstrated the sample's crystalline form. FT-IR and Raman spectroscopy made the functional groups and defect structures clear on the GO surface. The BET surface area estimate (212 m <sup>2</sup> /g) suggested its potential adsorption capability. To assess the effectiveness of GO in removing imidacloprid from aqueous solution, batch adsorption studies were carried out. The outcomes showed that the GO made from Indian coal has outstanding imidacloprid removal adsorption capabilities. The pseudo-second-order model provided the best fit. A maximum removal percentage of ca. 78% was noted for the model contaminant within 60 min, pH 4.5, concentration 2 mg/L of the experimental run. The adsorbent regeneration showed encouraging results with consistent repeatability in performance up to 5th cycle. This study demonstrates the potential of inexpensive, environmentally friendly graphene oxide made from Indian coal as an efficient adsorbent for the removal of imidacloprid insecticide, opening up exciting possibilities for reducing pesticide contamination in aquatic environments.