INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student	:	**Anil Kumar**
Roll Number	:	**196107102**
Programme of Study	:	**Ph.D.**

Thesis Title: **Corrosion inhibition of mild steel in corrosive mediums using bio-extracts and epoxy coating**

Name of Thesis Supervisor(s)	:	**Prof. Chandan Das**
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Recently, metal corrosion has become an emerging concern at both local and industrial scales, which hampers their conventional production unit. Corrosion is the destruction or deterioration of materials because of chemical and electrochemical reactions with their environment. It causes significant financial losses as well as harmful effects on the environment. To reduce these losses, several corrosion-controlling strategies have been employed, including material selection, cathodic protection, corrosion inhibitors, and anticorrosive coatings. Among them, green corrosion inhibitors and epoxy-based coatings are frequently used for metal protection due to their excellent effectiveness, simplicity, and cost-efficiency. In this work, we have exclusively prepared novel green corrosion inhibitors and a ternary RGO-ZnO-PANI nanocomposite as a nanofiller for epoxy coatings to protect the mild steel (MS) in 1 M HCl and 3.5% NaCl solutions, respectively. Plant extracts were prepared from different parts of *Sechium edule* (chayote), *Praecitrullus fistulosus* (tinda), *Phaseolus lunatus*, and *Duranta erecta* and characterized by liquid chromatography-mass spectrometry (LC-MS) and Fourier-transform infrared spectroscopy (FTIR) analysis. The findings of weight loss and electrochemical experiments showed that all inhibitors (extracts) viz. CE, CEPH3, TPE, TFE, PLPE, PLSE, DEFE, and DELE demonstrated strong corrosion-inhibiting behavior. Among these inhibitors, DELE showed the highest inhibition efficiency of 91.82% and superior thermal stability. Furthermore, electrochemical analysis, surface characterizations, and salt spray tests demonstrated that the epoxy coating containing RGO-ZnO-PANI nanocomposite exhibited the highest anti-corrosion performance in 3.5 wt% NaCl solution as compared to EP, EP/RGO, and EP/RGO-ZnO coatings.