INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: Developing Ecofriendly Nano-Particulate Adsorbents using Iron-Plant Polyphenols, Understanding the Molecular Properties and their Environmental Applications.

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SHORT ABSTRACT

Developing Ecofriendly Nano-Particulate Adsorbents using Iron-Plant Polyphenols, Understanding the Molecular Properties and their Environmental Applications

Removing pollutants using adsorbents made from natural ingredients is an exciting proposition from the standpoint of their cost-effectiveness and safety. Polyphenols are a class of chemicals widely distributed in leaves, seeds, and other parts of plants. They are known for their health benefits and antioxidant properties. Two iron(III) based new materials were synthesized from tannic acid (Mat-1) and guava leaf extract (Mat-2) in ~10 g scale under identical conditions. The physical properties, surface properties, and chemical properties of all three materials were analyzed using FESEM, FETEM, DLS, BET, pHzpc, CHNS analysis, Magnetic susceptibilities, EPR, XPS, Mass analysis, TGA, PXRD, FTIR. The results of FESEM and TEM showed the materials as clusters of nano-sized particles. The adsorbent properties of the materials were tested with anionic fluoride and cationic dyes. The biosafety of Mat-1 and Mat-2 was checked on mung beans (*Vigna radiata*) and on a number of bacteria.