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Topic of Research: **Removal of Pollutants from Aqueous Solution by Inorganic-organic Hybrid Adsorbents**

Findings

This thesis described the preparation of various Inorganic-organic hybrid adsorbents which include Molybdenum trioxide/polypyrrole (MoO_3/Ppy) nanocomposite, Gelatin-polyvinyl alcohol/lanthanum oxide composite, Sugarcane (*Saccharum officinarum* L.) bagasse carbon-based composite, and magnetic agar-g-poly(crotonic acid)/montmorillonite nanocomposite. These synthesized hybrid composites were employed as adsorbents for Nile blue, Cd^{2+} , As(III), As(V) Methylene blue, Methyl violet, Rose Bengal, and Bismarck brown, from aquatic solution with corresponding adsorption capacities of (189, 181, 61, 100, 261125, 228 and 61.39 mg/g, respectively). The hybrid composites were characterized by various spectroscopic techniques like Fourier Transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), N_2 adsorption-desorption (BET), Transmission electron microscopy (TEM), scanning electron microscopy (SEM), and energy dispersive X-ray spectroscopy (EDX) Non-linear isotherm and kinetic modelling were employed to appraise the equilibrium data. Reusability and real water analysis demonstrated that these adsorbents can be used for practical purposes. The adsorption of these pollutants onto the synthesized hybrid adsorbents occurs via different mechanisms that include, Hydrogen bonding, electrostatic, van der Waals $n-\pi$, and $\pi-\pi$ interactions .