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Synchrotron Radiation Fourier Transform Infrared (SR-FTIR) Spectroscopy in Exploring Crosslinked Chitosan-Rice Husk Bio-composite by Gamma Irradiation

To enhance the physical, chemical, or biological properties of polymer materials, the X-rays beam is used extensively to modify. The heavy metals in wastewater are hardly biodegradable and disposable in human organs because of their toxicity. Thus, an effective removal for the heavy metal ions from wastewater has triggered considerable concerns to environmentalists. Chitosan biomaterials have widely been used to absorb heavy metals from the wastewater and aquatic system due to its low residue generation and the ability to recycle and reuse adsorbents. The chitosan polymer's high abundance of amino groups also allows for numerous chemical changes to improve its adsorbent characteristics and adsorption capacity. This work synthesized the bio-composite from rice husk and coated its by chitosan solutions. The gamma irradiation had been applied to create the crosslinking chitosan to join of two or more intermolecular or intramolecular by a covalent bonding could give a more rigid structure and potentially a better-defined shape of the material. The Chitosan-Rice Husk bio-composite were irradiated using gamma radiation at dose of 50, 100, 200, and 400 kGy. Synchrotron Radiation Fourier Transform Infrared (SR-FTIR) Spectroscopy results revealed the induced crosslinking formation of bio-adsorbents after irradiation. The surface topography and composition of samples were demonstrated by using SEM. In conclusion, natural bioproduct or waste bioproduct has been successfully prepared as a high-efficiency adsorbent with satisfactory performance in heavy metal removal from aquatic ecosystems. The natural bioproduct or waste bioproduct is a new promising adsorbent for the removal of heavy metals from industrial wastewater.

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