TS4.4

Harnessing Microbial cell -Biochar Synergy for Eco-Friendly Wastewater Treatment

Aparna Singh, Soumya Koippully Manikandan, Vaishakh Nair*

Department of Chemical Engineering, National Institute of Technology Karnataka (NITK), Surathkal, Mangalore, 575025, India.

* Corresponding Author's Email ID: vaishakhnair@nitk.edu.in

ABSTRACT

The discharge of wastewater from chemical and commercial industries are major contributors to environmental pollution, with dyes being a prominent contaminant. Dyes mostly used in textile industries give rise to concerns such as mutagenicity and eutrophication, that poses a significant threat to ecosystem. While conventional physicochemical methods exist to manage these recalcitrant dyes, they are often unsustainable. Biological treatment methods are considered eco-friendly but have limitations: time consumption, less efficiency, and selectivity. Addressing these challenges, recent progress has been made in utilizing biochar as a promising solution due to its exceptional surface area, porosity, and adsorption capabilities. The present work focuses on the synergistic interaction between microbial cells and biochar, exploiting the catalyst support properties of peanut shell-derived biochar. Specifically, *Aeromonas Veronii* was immobilized onto peanut shell biochar and optimized for maximum immobilization potential by varying pyrolysis temperature. The biochar showing highest immobilization potential was characterized by FTIR, FESEM, and BET analysis. The effect of various parameters including dye concentration, initial pH and biocatalyst dosage was studied. The findings demonstrate the superior pollutant removal efficiency of the microbial cell immobilized biochar in comparison to free cells. The mechanism of dye removal indicated the synergetic interaction of biochar and microbial cell in dye removal. Moreover, this innovative approach exhibited promising outcomes in dye remediation, further endorsing its potential as a viable option for real-time applications.

Keywords: Dyes, Bioremediation, Biochar catalyst, Microbial cell immobilization, wastewater treatment

DOI: 10.21467/abstracts.164 ISBN: 978-81-965621-3-7 (eBook)