The College of Graduate Studies and the College of Engineering Cordially Invite You to a
Master Thesis Defense

Entitled

DEVELOPMENT OF TiO_2/NH_2-MIL-125 NANOCOMPOSITE FOR THE REMOVAL OF CIPROFLOXACIN UNDER INDUCED SOLAR IRRADIATION

By

Bilkis Mojisola Ajiwokewu

Faculty Advisor

Dr. Muhammad Tahir

Date and Time:

Thursday, 25 January 2024

1:00 pm

F3-132

Abstract

This research focuses on the development and application of Metal-Organic Frameworks (MOFs)-based nanocomposites for the photocatalytic removal of pharmaceutical contaminants, with a specific emphasis on ciprofloxacin (CIP). The photocatalytic degradation of CIP was investigated using as-synthesized photocatalysts of TiO_2 nanowires (TiO_2NWs), bare MOF of NH_2-MIL-125, TiO_2NW/NH_2-MIL-125 composite, and Lanthanum (La)-doped composite. Intriguingly, the TiO_2NW/NH_2-MIL-125 composite exhibited the highest efficiency, achieving a photodegradation rate of 0.0111 min^{-1}, surpassing the independent performances of bare MOF of NH_2-MIL-125 and TiO_2NW. The observed efficiency was attributed to the formation of a Z-scheme heterojunction which improves charge separation and the generation of active species ($\bullet O_2^-$ and $\bullet OH$) under the induced solar irradiation. Furthermore, the first-order rate constant of 0.0111 min^{-1} estimated for the TiO_2NW/NH_2-MIL-125 photocatalyst demonstrates promising and competitive performance when compared to prior research. This study emphasizes the potential for enhancing MOF photocatalytic properties through formation of heterojunction with inorganic photocatalysts like TiO_2, particularly for pharmaceutical wastewater treatment. This research presents a promising solution for addressing pharmaceutical contaminations and invites further exploration into MOFs-based photocatalysis, recognizing experimental limitations and the scarcity of relevant literature