The College of Graduate Studies and the College of Science Cordially Invite You to a

Master Thesis Defense

Entitled

SYNTHESIS, CHARACTERIZATION, ELECTRONIC STRUCTURE OF BiOCl/BiOBr/rGO TERNARY HETEROJUNCTION AND ITS PHOTOCATALYTIC ACTIVITIES

by

Salama Yousef Alismaail

Faculty Advisor

Dr. Ahmed Alzamly, Department of Chemistry

College of Science

Date & Venue

2:00pm

Wednesday, 11 November 2020

Abstract

Solar energy is free, most abundant among all renewable energy sources. Energy from the sun reaches the earth surface at a rate of 1.2 X 10^5 TW by far, exceeding the current world energy consumption of 17 TW (1TW = 10^{12} J/s). Accordingly, development of visible light driven photocatalysts is of considerable interest in clean and renewable energy, as well as in wastewater treatment. In that context, BiOCl and BiOBr and three different mole ratio composites were prepared, characterized using UV-vis DRS, PXRD, BET, SEM, and EDS and their photocatalytic activity for the photoreduction of 4-NA was evaluated. Results show that varying the mole ratio of BiOCl and BiOBr in the composites has no effect on the band gap energy. XRD patterns confirm the purity of the samples and SEM images show that pure BiOCl and BiOBr have a flake like morphology, however, prepared composites showed agglomerated particles. Moreover, BiOCl showed the lowest surface area of 3.30 m^2/g, compared to the prepared composites where $BiOCl_{50\%}/BiOBr_{50\%}$ showed the highest surface area of 4.72 m^2/g. $BiOCl_{75\%}/BiOBr_{25\%}$ presented higher photocatalytic activity compared to pure BiOCl and BiOBr indicating that the formation of a heterojunction facilitates electron transfer for photoreduction. In addition, the highest photocatalytic activcity $BiOCl_{75\%}/BiOBr_{25\%}$ was synthesized incorporating different rGO ratios. Results confirm the successful incorporation of rGO into the composite. Also, their photocatalytic activity was evaluated for the photoreduction of 4-NA, where composite of 5%rGO load exhibited the highest photocatalytic activity.

Keywords: Photocatalyst, Band gap, BiOCl, BiOBr, rGO, composites