

## **ABSTRACT**

The synthesis of Graphene oxide doped Fe<sub>2</sub>O<sub>3</sub>/MnO nanocomposites was successfully achieved through a one pot hydrothermal method. The synthesized products were confirmed through Fourier Transform Infra-red radiation, UV-Visible spectroscopy, Photoluminescence, and Particle size analyzer. The optical energy gap was determined through the Wood and Tauc relation, yielding values of approximately 4.2, 4.8, and 3.9 eV. Additionally, the photocatalytic efficiency under UV irradiation demonstrated degradation rates of 93.52%, 72.72%, and 93.23% for Methylene blue (MB) dye in GFM 50, 100, and 150 nanocomposites, respectively. The electrochemical application of GFM 50, 100, and 150 was examined using cyclic voltammetry (CV), galvanostatic charging and discharging (GCD), and electrochemical impedance spectroscopy (EIS). The specific capacitance values recorded for GFM 50, 100, and 150 were 117.9932, 128.5900 and 165.2877 (F/g), respectively.

### **Keywords:**

Hydrothermal, photocatalysis, waste water, electrode formation cyclic voltammetry, galvanostatic charging and discharging, and electrochemical impedance spectroscopy