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## Synthesis and characterization of a coated Fe-Ag@ZnO nanorod for the purification of a polluted environmental solution under simulated sunlight irradiation

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### Abstract

The zinc oxide (ZnO) nanostructure was synthesized and modified by Fe-Ag. A glass slide was then coated with it by the chemical co-precipitation method. The composites were characterized by powder X-ray diffraction (XRD), FTIR spectroscopy, FE-SEM, EDAX, elemental mapping, TEM and UV-Visible spectroscopy. The optical, structural, and photocatalytic properties of Fe-Ag@ZnO nanoparticles were analyzed. XRD analysis showed that the samples were in the hexagonal-wurtzite phase. The diethylhexyl phthalate (DEHP) was >90% eliminated within 120 minutes at a loading of 20 mg L<sup>-1</sup> Fe-Ag@ZnO. This study suggested that Fe-Ag doping on ZnO reduces the band gap and can be used with LED-visible light to purify a polluted environment.

**Keywords:** Fe/Ag@ ZnO, Sunlight irradiation, Nanorod

### 1. Introduction

ZnO is one of the most important semiconductors. It is a nontoxic and biocompatible material with good chemical and thermal stability [1]. ZnO, with a large band gap (3.37 eV) at laboratory temperature, has drawn a lot of

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