ISSN: 1391-8796
Proceedings of 11th Ruhuna International Science & Technology Conference
University of Ruhuna, Matara, Sri Lanka
January 24, 2024

Marine algae derived ZnO NPs, Ag NPs and Ag/ZnO NCs for photocatalytic activity

Senanayake E.R.M.K. and Thiripuranathar G.*

College of Chemical Sciences, Institute of Chemistry Ceylon, Sri Lanka

Green synthesis of nanoparticles and nanocomposites using natural sources like microbes or plant extracts as stabilizing and reducing agents offers eco-friendly and sustainable advantages. The aim of this study was to synthesize zinc oxide nanoparticles (ZnO NPs), silver nanoparticles (Ag NPs), and silver/zinc oxide nanocomposites (Ag/ZnO NCs) by employing an aqueous extract derived from *Sargassum polysistum*, a prevalent marine algae species in Sri Lanka. The synthesized nanoparticles and nanocomposites were then utilized to assess their photocatalytic activity. The photocatalytic activity of the NPs and NCs were measured by the degradation of methylene blue (MB) dye under Sunlight. The synthesized NPs and NCs were characterized using UV-Visible Spectra Analysis, FT-IR spectra analysis and Scanning Electron Microscopy analysis. The Ultraviolet-Visible spectrum exhibited a hypsochromic shifted absorption band between 360–380 nm for ZnO NPs 440-470 nm for Ag and broad band between 360-500 nm for NCs. FTIR analysis identified the specific vibrational modes associated with various functional groups. SEM analysis was carried out to determine the surface morphology of the nanoparticles resulted cross-sectional diameters of synthesized ZnO NPs, Ag NPs and Ag/ZnO NCs were 121.42±4.24 nm, 95.99±3.60 nm and 154.18±4.60 nm respectively. The photocatalytic degradation of MB reaches a maximum of 92.5% for biogenic Ag/ZnO NCs when monitoring spectrophotometrically (λ_{max} = 662.8 nm) under solar irradiation while ZnO NPs reached 82.6% and Ag NPs reached 84.7% accordingly. Therefore, marine algal mediated nanomaterials contribute to environmentally friendly and efficient photocatalyst development, with significant implications for environmental remediation and solar energy utilization.

Key words: nanocomposites, degradation, hypsochromic, irradiation, remediation

Acknowledgement: *College of Chemical Sciences, Institute of Chemistry Ceylon, Sri Lanka.*

*Corresponding author: tgobika@ichemc.edu.lk