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# Bioengineering of Zinc orthotitanate nanomaterials using hibiscus sabdariffa: electrochemical, and photocatalytic applications

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The bioengineering of bimetallic oxides is an essential requirement for both societal and environmental applications. In this research, bimetal oxide nanomaterials, particularly Zinc orthotitanate (Alpha-Zn2-TiO4), were synthesized using an environmentally friendly method that incorporates natural extracts from Hibiscus Sabdariffa. A variety of techniques were employed to examine the physicochemical properties of the synthesizedZinc orthotitanate nanocomposites, as including XRD, SEM, EDS, FTIR, PL, and DLS analysis, which revealed the crystalline structure of theZinc orthotitanate nanocomposites, their morphology, the presence of elements such as O, Ti, and Zn, indicated the existence of various functional groups, observed the charge transfer characteristics present in the surface state, and corroborated the nanoscale distribution of the compounds, consistent with the SEM results. Additionally, theZinc orthotitanate nanocomposites demonstrated outstanding electrochemical properties, along with its ability to degrade Methylene Blue (MB) dye, achieving a photodegradation rate of 92.3%, thereby emphasising the advantages of Hibiscus-mediated green synthesis.
Keywords: Hibiscus, Zinc orthotitanate , Photoactivity, Electrochemical Properties.

**Author:** FALL, Adama (University of South Africa(UNISA))

**Co-author:** Prof. MAAZA, Malik (UNESCO-UNISA Africa Chair in Nanosciences-Nanotechnology, College of Graduate Studies, Muckleneuk Ridge, PO Box 392, Pretoria, South Africa)

**Presenter:** FALL, Adama (University of South Africa(UNISA))

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