

## World Congress on CHEMISTRY &amp; CHEMICAL TECHNOLOGIES

March 15-16, 2023 | Webinar

**Synthesis and Characterization of Nickel Doped Bismuth Oxide (Ni-Bi<sub>2</sub>O<sub>3</sub>) Nanoparticles for Photocatalytic Degradation of Malachite Green and Methyl Blue****Yousaf Khan***Quaid-i-Azam University, Pakistan*

The pure Bismuth Oxide and (2&4%) Nickel-doped Bismuth Oxide nanoparticles (Nps) are synthesized by precipitation method. The synthesized nanoparticles are characterized by UV-Visible (UV-Vis) Spectroscopy, X-Ray Diffraction Analysis (XRD), Fourier Transform Infra-Red (FTIR) Spectroscopy, and Photoluminescence (PL). From UV-visible spectroscopy, the band gap of Bi<sub>2</sub>O<sub>3</sub> nanoparticles was calculated and it was found to be

2.68 eV. For (2&4%) Nickel doped Bismuth Oxide NPs increase in band gap was observed. The crystallinity and average crystallite size are determined by XRD analysis. The average particle sizes of the nanoparticles are in the range of 110-33 nm. FTIR is used to confirm the absence of any impurities and to confirm the stretching and bending modes of the required functional group. From the PL study, it is confirmed that with doping nickel in the Bi<sub>2</sub>O<sub>3</sub>, the chance of electron-hole pair recombination reduces. Pure and nickel-doped Bi<sub>2</sub>O<sub>3</sub> NPs are used as photocatalysts for photo-degradation of Malachite Green (MG) and Methyl Blue (MB) dyes. Among all photocatalysts, 4% Ni-Bi<sub>2</sub>O<sub>3</sub> NPs showed the highest photocatalytic degradation efficiency (PDE). The effect of different parameters i.e., the amount of photocatalyst, the concentration of dye, pH of solution on PDE is studied for optimization. The optimized catalyst amount is 3 mg, 20 µM MG dye concentration, and pH 9 while for MB dye, the concentration is 18 µM. Kinetic study shows that photocatalytic degradation obeys pseudo-first-order kinetics. The present study explains the importance of selecting optimal degradation parameters for practical application. Using an optimized catalyst, the maximum PDE for Malachite green is 98%, and that for Methyl Blue, the PDE is 78.98%. So heterogeneous photocatalysis can be employed as an efficient and environmentally friendly technique for the removal of coloring agents from the industrial effluent for the reuse of wastewater.

**Biography**

Yousaf Khan completed his Master's at the age of 22 years from Quaid-i-Azam University, Islamabad. He has published a review paper in a reputed journal "Catalysts" impact factor 4.501.