ABSTRACT

The growth of the textile industry in Indonesia has led to an increase in hazardous wastewater pollution, one of which is methyl orange (MO), a toxic azo compound that is difficult to degrade in the environment. Photoelectrocatalysis is an effective and environmentally friendly method for degrading such compounds, with $BiVO_4$ emerging as a promising photoelectrocatalyst due to its narrow band gap and visible light absorption capability. Bismuth vanadate was synthesized as a thin film on an FTO substrate using the dip coating method, followed by annealing at 350 °C and 550 °C for 2 hours. Characterization was carried out using UV-Vis DRS, XRD, SEM-EDX, and fluorescence spectrophotometry to determine the band gap energy, crystal structure, morphology, elemental composition, and luminescent properties. The $BiVO_4$ thin film annealed at 550 °C exhibited a monoclinic crystal structure, uniform morphology, a band gap of 2.30 eV, and low emission intensity, indicating reduced charge recombination. This film successfully degraded 8 ppm of MO with an efficiency of 71.14% within 60 minutes under visible light irradiation. The study confirms that the dip coating method is effective in producing photoelectrocatalytically active $BiVO_4$ thin films for for methyl orange degradation.

***Keywords**: $BiVO_4$, thin film, dip coating, photoelectrocatalysis, methyl orange*