## ABSTRACT

Cadmium sulfide (CdS) is a good semiconductor in photocatalytic because it can absorb visible light efficiently. Photocatalytic is an effective method for dye degradation and minimizing harmful organic pollutants. Methylene blue (MB) is a textile dye that is often discharged into waters. Water pollution by MB waste can cause carcinogenic effects in humans. This study synthesized CdS through green synthesis with tea leaf extract (*C. sinensis*) and calcination time variation. CdS was characterized to determine the best material. The photocatalytic activity of MB with CdS catalyst was carried out to determine the best CdS material. CdS was synthesized through green synthesis method with tea leaves (*C. sinensis*) to obtain smaller CdS powder and calcination time variation treatment for band gap modifying. CdS was calcined with time variations of 1, 2, 3, and 4 hours. Calcination time variation treatment on CdS can modify the band gap and crystallinity so as to increase the photocatalytic efficiency. Photocatalytic tests were conducted to see the effectiveness of CdS samples in degrading MB. The 1 and 3 hours calcined CdS photocatalysts were analyzed using FTIR, XRD, and UV-DRS. This study shows that the higher the calcination time, the more the yellow color of CdS will fade. The photocatalytic results show that the 3-hour calcined CdS has the best degradation effect with a degradation percentage of 46.15%. This study proves that the more mass of CdS in photocatalytic, the greater the percentage of degradation. FTIR characterization results show the presence of CdS. Diffraction results on XRD test showed that calcination time affects the crystallinity of CdS. The results of the band gap in the UV-DRS Spectrophotometer test show that calcination time can change the band gap of the material. Calcined CdS of 1 and 3 hours has band gaps of 2.36 and 2.31 eV.



**Keywords**: cadmium sulfide, calcination, photocatalytic, methylene blue