In-situ Synthesis of Zinc Oxide Seeds on Thin Film of Mica as the Highly Reactive Photocatalyst Under UV-Light Irradiation

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Structurally layered mica has attracted much attention of the mineralogists due to its unique structural properties. This study mainly concerns in developing the nano-seeds of Zinc oxide on thin film of mica (ZnO-mica) and the potential study of the photo-catalytic property under UV-light irradiation. The ZnO-mica was prepared by the *In-situ* growth of nanoparticles. 5 g of (0.5 cm × 0.5 cm) cut thin films of mica was added to the mixture of 600 µL, 50 mL of Cetyltrimethylammonium chloride (CTAC) and 2 mol dm^{-3}, 50 mL of zinc nitrate hexahydrate. Then, $Zn(OH)_2$ seeds were grown on the thin sheets of mica by adding 4 mol dm^{-3}, 50 mL of NaOH solution with stirring for 24 hrs. The obtained product was then calcined at about 600 ℃. Finally, photo-catalytic property study was carried out in beakers containing 50 mL of Methylene Blue (MB) with various dose of (1.0, 3.0, 4.0 and 10.0 g) ZnO-mica. UV-Vis spectroscopy analysis was implemented with 30 min of time interval under the UV-light irradiation with initializing under dark condition for 30 min to 3.5 hrs. The synthesized final product was characterized by using the characterizing techniques such as X-ray powder diffraction and scanning electron microscopy (SEM), energy dispersive X-ray spectroscopy (EDS), Fourier transform infrared spectroscopy and thermo gravimetric analysis. The analytical data from the SEM reveal that the synthesized product with flower-like morphology having average particle length and width are 800 nm and 50 nm respectively. The crystallinity and the chemical analysis using XRD and FT-IR confirm the presence of ZnO on mica. The plot of percentage dye degradation versus time with increasing dosage under UV light indicates the rapid photo-catalytic dye degradation with increasing dosage of the photo-catalyst. The simple, flexible and novel method has been devised to develop the photo-catalyst under the UV-light irradiation.

Keywords: Zinc oxide seeds on thin film of mica, *In-situ* growth, Photo-catalyst, Flowerlike nanoparticles, Dye degradation