

Research Title Synthesis of $ZnFe_2O_4$ - TiO_2 photocatalyst and a study on its photocatalytic property

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Abstract

Natural dye-sensitized amorphous TiO_2 photocatalysts were prepared by impregnation method using 4 natural dyes extracted from lac, sappan wood, jackfruit wood, Gamboge tree as sensitizer. The physical properties of the products were studied using several techniques such as X-ray powder diffraction (XRD), Scanning electron microscopy (SEM), Fourier-transformed infrared spectroscopy (FT-IR), specific surface area by Brunauer-Emmett-Teller method, UV-Vis diffuse reflectance spectroscopy (DRS). The physical appearance of TiO_2 modified with brazilin and laccaic acid revealed red color and TiO_2 modified with morin and gambogic appeared yellow color. XRD patterns of natural dye-sensitized amorphous TiO_2 showed the phase of amorphous and revealed that the impregnation of natural dyes did not affect the amorphous form. SEM images revealed that titania nanoparticles had uniform spherical shape with different size. The FT-IR spectra showed the characteristic bands of titania and natural dye contents. The DRS spectra revealed the natural dye-sensitized amorphous TiO_2 showed higher bathochromic shift. The photocatalytic activity was evaluated via methylene blue (MB) degradations under visible light irradiation. The natural dye-sensitized amorphous TiO_2 exhibited higher catalytic efficiency than the pure amorphous TiO_2 .

Key words : TiO_2 , natural dye, lac, sappan wood, jackfruit wood, Gamboge tree,
photocatalyst, dye decolorization