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N-doped Ni/C/TiO₂ nanocomposite as effective photocatalyst for water splitting

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Abstract:

N-doped Ni/C/TiO₂ nanocomposite is introduced as an effective photocatalyst for water splitting under visible light radiation. The proposed photocatalyst contains most of the effective co-catalysts enhancing the photocatalytic activity of the titanium oxide. The nanocomposite was prepared by sintering a vacuously dried sol-gel composed of polyvinylpyrrolidone, titanium isopropoxide and nickel acetate under nitrogen atmosphere at 700 °C for 3h. TEM, XRD and XPS analyses confirmed that the introduced catalyst is N-doped & TiO₂-incorporated amorphous carbon sheets decorated by Ni nanoparticles. The introduced nanocomposite revealed distinct performance as photocatalyst toward water splitting reaction, numerically the generated hydrogen was 0.383 mmol.sec⁻¹.g_{cat}⁻¹; 8.6 ml.sec⁻¹.g_{cat}⁻¹. However, nickel content somewhat influences the catalytic performance; 15 wt% reveals the best performance.

Keywords: Nanocomposites; Carbon materials; Water photosplitting

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