

Analysis of Li-intercalated TiO₂ nanoparticles for photocatalytic production of hydrogen

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Alkali metal ion intercalation into TiO₂ photocatalysts are a well-known as the method for obtaining enhanced photocatalytic properties. However, TiO₂ photocatalyst only operates under the irradiation of ultra-violet light due to the wide bandgap. Li⁺ intercalation process exhibits not only, improved photocatalytic activities but, decreased recombination rate. Herein, an effective electrochemical intercalation method is proposed for the synthesis of lithium-intercalated TiO₂ nanoparticles suitable for high performance photocatalytic production of hydrogen. XPS and XANES analysis was conducted and confirmed that Ti⁴⁺ was reduced to Ti³⁺ as a result of lithium intercalation. Consequently, intercalated TiO₂ is enhanced not only optical property but photocatalytic performance for H₂ generation.