Short Communication

Confined Preparation of N-doped Commercial P25 TiO₂ Photocatalysts with Fast Charge Separation by Argon-diluted Nitrogen Plasma Treatment

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N-doped TiO₂ attracts enormous attention due to its cheapness and excellent visible-light-driven photocatalytic activity. An approach assisted by Nitrogen plasma to synthesize the N-doped TiO₂ is presented in our work by using commercial available Degussa P25 as raw material. X-ray photoelectron spectroscopy (XPS) and transmission electron microscope (TEM) measurement results show that the evidence of N doping and the formation of surface disorder layer, which can both serve as active sites. Electrochemical characterizations verified the excellent photo-generated charge separation feature of the obtained N-doped P25 TiO₂. High absorption of visible light, fast charge separation and numerous active sites ensure the excellent photocatalytic activity for the N-doped P25 TiO₂ in the photo-oxidation of organic molecules in water. It is noteworthy that the Argon-assisted Nitrogen plasma treatment is superior to conventional pure Nitrogen plasma treatment because of confined Nitrogen ionization. From the results, this plasma treatment method may open up a new way to the application of plasma technology in the activation commercial materials.

Keywords: N-doped TiO₂, Plasma Treatment, Charge Separation, Transient photocurrents

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