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# Photocatalytic water splitting for hydrogen production from N-TiO<sub>2-x</sub>/(Au or Pt) prepared by Nitrogen gas plasma (AC) method

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## Abstract

We reported in previous papers a novel method for metal impregnation, using argon or nitrogen gas plasma using a AC glow discharge plasma treatment for production nanostructured TiO<sub>2</sub>/Metal (Metal=Au and Cu) [1, 2]. In this work, it is shown that doping of titania Degussa P25 in the presence of Pt or Au using N<sub>2</sub> gas plasma (AC) can induce the deposition Pt/Au nanoparticles over the titania particles surface. This material, known as N-TiO<sub>2-x</sub>/(Pt or Au) is characterized by X-ray photoelectron spectroscopy (XPS), X-ray diffraction (XRD), and UV-Vis diffuse reflectance spectroscopy. In this work the photocatalytic activity of the developed material as well as the hydrogen generation from water/methanol mixtures is studied. It is observed that the Pt or Au impregnation over TiO<sub>2</sub> nanoparticles using N<sub>2</sub> gas plasma (AC) improves the light-induced hydrogen production, due to the water splitting process, as compared with non-doped nanostructured titania. This can be attributed to the N-doping of the lattice structure of titania, and a possible enhancement in the TiO<sub>2</sub>-Pt/Au synergy induced by the plasma treatment.

## References

1. R. Trejo-Tzab, J. J. Alvarado-Gil, P. Quintana, *Top. Catal.* 54 (2011) 250-256.
2. R. Trejo-Tzab, J. J. Alvarado-Gil, P. Quintana, P. Bartolo-Pérez, *Catal. Today* 193 (2012) 179-185.

**Keywords:** Degussa P25, TiO<sub>2</sub> nanoparticles, UV/Vis irradiation, TiO<sub>2</sub>/Pt, N<sub>2</sub> plasma, TiO<sub>2</sub>/Pt, hydrogen production.

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