

## Synthesis, Characterization and Photocatalytic Performance of TiO<sub>2</sub> Co-Doped with Sulfur and Nitrogen

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**Abstract :** The objective of this study is based on the synthesis of a new photocatalyst based on TiO<sub>2</sub> and its application in the photo-degradation of an acid dye under the visible light. The material obtained was characterized by different techniques like diffuse reflectance UV-Vis spectroscopy (DRS), X-ray diffraction (XRD) and scanning electron microscopy (SEM). The photocatalytic efficiency of the S, N co-doped TiO<sub>2</sub> treated at 600°C for 1 h was tested on the Indigo Carmine under the irradiation of visible light and compared with that of the commercial titanium oxide TiO<sub>2</sub>-P25 (Degussa). The XRD characterization of the material S-N-TiO<sub>2</sub> (600°C) revealed the presence of the anatase phase and the absence of the rutile phase in comparison of the TiO<sub>2</sub> P25 diffractogram. Characterization by UV- visible diffuse reflection (DRS) material showed that the S-N-TiO<sub>2</sub> exhibits redshift (move visible) relative to commercial titanium oxide TiO<sub>2</sub>-P25, this property promises a photocatalytic activity of S-N-TiO<sub>2</sub> under visible light. Indeed, the efficiency of photocatalytic S-N-TiO<sub>2</sub> as a visible light is shown by a complete discoloration of indigo carmine solution of 16 mg/L after 40 minutes, whereas with the P25-TiO<sub>2</sub> discoloration is achieved after 90 minutes.

**Keywords :** POA, heterogeneous photocatalysis, TiO<sub>2</sub>, co-doping

**Conference Title :** ICSRD 2020 : International Conference on Scientific Research and Development

**Conference Location :** Chicago, United States

**Conference Dates :** December 12-13, 2020