XXI Brazilian Meeting on Inorganic Chemistry
X Brazilian Meeting on Rare Earths
III Workshop on Theoretical Bioinorganic Chemistry
Belo Horizonte, September 12 - 15th 2024

Structural analysis of the composite based in TiO_2 and carbon dot from *o*-phenylenediamine

Maria Vitória P. Vaz [1], Mayara M. Caetano[2] and Renata G. de Lima[1]

[1]*Instituto de Ciências Exatas e Naturais do Pontal-ICENP, Universidade Federal de Uberlândia, Ituiutaba/MG, Brasil*

[2] *Instituto de Química (IQ), Universidade Federal de Uberlândia (UFU), Uberlândia/MG, Brasil*

E-mail: mvitoriavaz.quimica@ufu.br

Thematic Area: Materials Chemistry

Keywords: carbon dot, TiO_2, photodegradation.

TiO_2 nanoparticles when are modified with carbon dots, some significant improvements can be achieved mainly in terms of broadening the light absorption wavelengths [1]. This work aims to obtain two nanocomposites with different percentages of *o*-phenylenediamine (*o*-OPDA) carbon dot (CDsOPDA) adsorbed on the surface of rutile titanium dioxide (TiO_2) for photodegradation of dyes. The studies vise to assess the photocatalytic efficiency of the materials. In the synthesis, the nanocomposite (1) consisted in 400 mg TiO_2 and 20 mg CDsOPDA and nanocomposite (2) 400 mg TiO_2 and 200 mg CDsOPDA. The proportion of TiO_2 and *o*-OPDA were dispersed 50% ethanol: water and added in a hydrothermal reactor. Nanocomposites were synthesized at 473 K in a muffle and posteriorly purified under successive washing with water. The XRD analysis did not reveal any change in the crystal structure of rutile TiO_2 between nanocomposites. These results are indicative that the carbon dot is adsorbed on the surface of the semiconductor and is independent of *o*-OPDA concentration in the preparation. The isotherms obtained in ASAP suggest that the nanocomposites are non-porous adsorbents and macroporous. The pore diameters and volumes of the rutile TiO_2 do not present significant differences with the nanocomposites. However, was observed a decrease in the surface area (BET) for nanocomposite (1) in comparison with (2). The reflectance spectra (Figure 1A) of the nanocomposite (2) confirmed its absorption in the visible-light region and a displacement of the band gap in compared to TiO_2. Photocatalysis studies demonstrated the potential application of nanocomposite (1) in dye degradation red light (Figure 1B) [2].

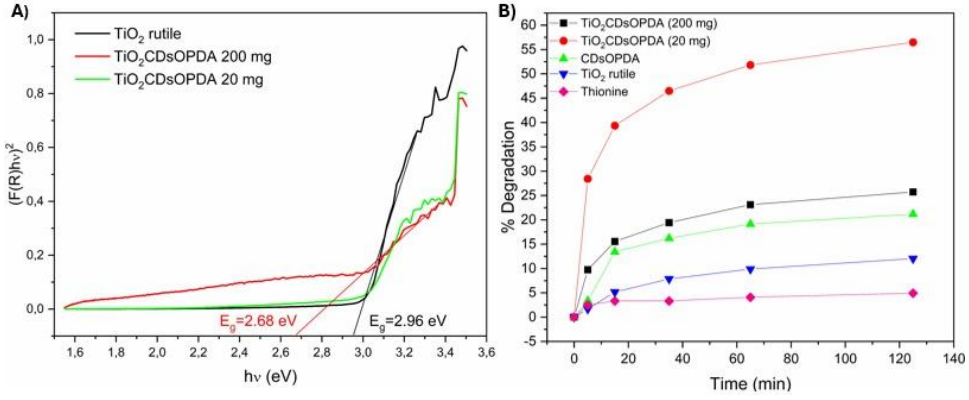

Figure 1. Reflectance spectra (A). %Thionine Photodegradation in function of the time irradiating with 630 nm light in different times (B).

Acknowledgments: RELAM-UFU, CNPs and CAPES.

References

[1] Bokare, A.; Chinnusamy, S.; Erogbogbo, F. *Catalysts*, **11**, 319, (2021).

[2] Z. Zhao, *et al., Green Chemistry,* **23,** 4524, (2021).