

Influence of Cu substitution on the structural ordering, photocatalytic activity and photoluminescence emission of $\text{Ag}_{3-2x}\text{Cu}_x\text{PO}_4$ powders

Wyllamanney da S. Pereira¹, Júlio C. Sczancoski^{1*}, Yormary N. C. Calderon²,
Valmor R. Mastelaro², Gleice Botelho³, Thales R. Machado¹, Edson R. Leite¹,
and Elson Longo¹

¹Universidade Federal de São Carlos (UFSCar), Departamento de Química, São Carlos-SP, Brazil

²Universidade de São Paulo (USP), Instituto de Física de São Carlos, São Carlos-SP, Brazil

³Universidade Federal do Tocantins (UFT), Química Ambiental, Gurupi-TO, Brazil

*Email: jcsfisica@gmail.com

Abstract:

Materials presenting high photocatalytic performance and interesting photoluminescence emissions are promising candidates for photodegradation of organic pollutants discharged into natural waters as well as for development of new electro-optical devices, respectively. In this study, $\text{Ag}_{3-2x}\text{Cu}_x\text{PO}_4$ ($x = 0.00, 0.01, 0.02, 0.04$ and 0.08) powders were synthesized by the precipitation method. The long- and short-range structural ordering was affected when the copper (Cu) content was increased in the lattice, as identified by X-ray diffraction patterns, Fourier transform infrared spectroscopy and Raman spectroscopy, respectively. The field emission scanning electron microscope and transmission electron microscope revealed a particle system composed of irregular spherical-like microcrystals. The presence of Cu as well as its real amount in the samples were confirmed by means of X-ray photoelectron spectroscopy and inductively coupled plasma-atomic emission spectrometry, respectively. On increasing Cu level, a slight variation was noted on the photocatalytic activity of $\text{Ag}_{3-2x}\text{Cu}_x\text{PO}_4$ powders for degradation of rhodamine B under visible light irradiation. A photodegradation mechanism was proposed in details. The

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