SYNTHESIS OF ZnIn$_2$S$_4$ AND M-ZnIn$_2$S$_4$ (M= Au, Ag and Cu) FOR PHOTOCATALYTIC APPLICATIONS
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Ternary semiconductor have been of great interest in the last past years due to their structural and optical properties, especially porous and nanostructures materials, based in ternary semiconductor have been studied for photocatalysis applications. In order to increase the degradation efficiency, metallic nanoparticles have been coupled with ternary semiconductors. In this work, the results of structural and optical characterization of ZnIn$_2$S$_4$ and M-ZnIn$_2$S$_4$ (M=Ag, Au and Cu) composites are reported and the photocatalytic behavior was evaluated by the degradation of metil-orange. The synthesis was carried out by an open microwave method using a graphitic structure as catalyzer. The characterization was performed by XRD, UV-Vis, PL, SEM. The UV-Vis spectra shows the visible light activity of the compound and the modification of the absorption profile due to the presence of the metallic nanoparticles. The PL analysis indicates the heterojunction formation between both materials and the improvement of the charge separation when activated with visible light. SEM images shows the formation of porous sphere with diameter of 500 to 1000 nm; they are built from laminar structures of semiconductor. The addition of the metallic nanoparticles shows decorated structures, where the metals are located on the surface of the laminar structures. The Photocatalytic behavior shows an improvement of 20-35 % for the degradation process compared to the puere ZnIn$_2$S$_4$ due to the presence of the metallic nanoparticles.

Keywords: photocatalysis, metallic-semiconductor composites, microwave synthesis

References:


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