Title: **Nanostructuration of ternary semiconductor materials for the development of optoelectronic devices**

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During the last years, the nanoscience has shown a large number of applications and its use is becoming more frequent. One area where it is increasingly being used is in optoelectronics where nanoparticles have begun to take force as a material for solar cells. Concretely a material widely used for these are the chalcogenides, in particular, those of CdS. A variant of these chalcogenides is the AgCuS that a priori could present similar properties and has an advantage over the Cd, none of the elements is potentially toxic.

On the following study, we have attempted to synthesize nanoparticles of this material by the method of thermal decomposition of molecular precursors. Based initially on a so-called "standard synthesis", several reaction parameters were modified in order to optimize the size and purity of the desired nanomaterial. First we made modifications of one parameter and finally they even modified two. These modified parameters are the reaction temperature, the molecular precursor species, the molecular precursor concentration and the surfactant concentration. In addition, we attempted to study the reaction mechanisms of different syntheses, in which precursor species were CuCl, $CuCl_2$ and CuI.

In order to characterize the samples, we used: X-ray diffraction, transmission electron microscopy, UV-Visible-NIR spectroscopy and fluorescence spectroscopy.

The results show that there are three possible stoichiometries for this ternary material, AgCuS, $Ag_{1.2}Cu_{0.8}S$ and Ag_3CuS_2. Finally, we were able to create a route of synthesis with defined parameters where it was possible to obtain apparently pure material of AgCuS.

Keywords: Nanoparticle, synthesis, AgCuS, thermal decomposition, nanomaterial