Hematite Thin Films Produced by Spray Pyrolysis Method for Water Splitting

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ABSTRACT

The increasing demand for clean energy sources is driving research for the development of alternative energy technologies. Based on the requirement for clean, preferably carbon-neutral technologies, hydrogen is considered as an ecologically benign green fuel with high energy density. The natural photosynthesis process has served as source of inspiration for the design of artificial photosystems. With these systems the water splitting occurs, produced H_2. In this context, semiconductors have the primary role in these systems, because in this materials occurs the charge separation (e^--h^+) leading to the redox processes of interest. In particular, the hematite (α-Fe_2O_3) is one of the most promising materials for water splitting, due to its availability and its good light absorption of the solar spectrum with a band gap about 1.9−2.2 eV. Moreover, this material is obtained from inexpensive reagents, is relatively easy to synthesize, is not harmful and is very stable in contact with aqueous solutions. Previous works have not been reported of good efficiency of these materials in the process of converting light energy. The present work aims to obtain thin films of hematite over a conductive substrate, by the Spray Pyrolysis, structural characterization and photoelectrochemical behavior for the films obtained was discussed as a function of thickness.

Keywords: Water splitting, Photoelectrochemistry,