THE EFFICIENCY OF DYE-SENSITIZED SOLAR CELLS USING CARBON AEROGEL WITH SILVER SULFIDE NANOPARTICLES AS COUNTER-ELECTRODES

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Currently, there are several types of solar cells. Above all, dye-sensitized solar cells (DSSC) have received much attention due to the advantages they have over conventional solar cells, such as low cost and simple manufacturing method, use of non-polluting materials, in addition to the fact that perform well in low light conditions. Because DSSCs have not yet reached optimum efficiency for large-scale manufacturing, recent research is focusing on the counter electrode which is usually made of platinum (Pt). This element ages with time. In this work, Carbon Aerogel with Silver Sulfide Nanoparticles (AC-Ag2S) synthesized by cathodic deposition and solid vapor reactions are proposed as a counter electrode instead of the conventional Pt. The obtained efficiencies are in the range of 1 to 2.5%. These are low values compared to those reported for platinum and are a consequence of a poor fill factor (FF) that can be explained by the electrolyte loss that occurs during the cell testing due to the high aerogel absorption. However, high initial Jsc values (21 mA/cm2) were found which suggests that this composite could be a promising material to improve the cell efficiency if the electrolyte problem is resolved. The optical and electrical properties of the synthesized electrodes as well as the cell efficiency, Voc, Jsc, and FF are presented.

Keywords: Dye-sensitized solar cell, Counter-electrode, AC-Ag2S

Acknowledgment:

To, the National Council of Science and Technology (CONACYT) for granting scholarship No. 1144740, in the Doctorate Program in Materials Sciences enrolled in the National Quality Postgraduate Program (PNPC).

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