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Challenges for Nano-Materials for Quantum Dots sensitized Solar cells

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Quantum Dot Sensitized solar cells (QDSSCs) are interesting energy devices because of their architecture using different nano-structures such as nanowires and quantum dots that have an impressive ability to harvest solar energy, promising conversion efficiency exceeding 8% with long durability and low manufacturing cost. They are considered as an excellent candidate for 3rd generation solar cell, due to their low cost and acceptable conversion efficiency. Researchers are putting a great effort to improve QDSSC efficiency, by studying new emergent materials for the working and counter electrodes, hole transport layer and the sensitizers (absorbers).

ZnO Nanowires have been widely studied because of their unique properties and their promising application in Solar cells. On the other hand Quantum dots, span the optical absorption on most of the solar spectrum due to its tunable band gap, which lead to an improved light absorption. PbS Quantum dots have been used in our QDSSCs, as a proof of concept due to its unique properties with a narrow band gap and high Bohr radius. But many other materials have to be explored to replace PbS because of its toxicity. It is very important to study the properties of these materials and the role that they will play as light absorber and their impact in increasing the conversion efficiency in order to meet the important objective of our research which is to develop an eco-green solar cell with high conversion efficiency. In this presentation, we will present the importance of absorbers, their nature, size and density that will play an important role in light trapping, absorption and electron injection.

Keywords: ZnO, nanowires, Quantum Dots, sensitized solar cells, PbS, Absorber.

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