

Improving the Efficiency of Organic Solar Cells Through the addition of Silver Nanoparticles and Cadmium Oxide
(*MSc thesis presentation*)

Matthew Hunt

Department of Physics and Physical Oceanography
Memorial University

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ABSTRACT: The development of renewable energy technologies has received significant attention in recent years. Among the many different approaches, organic solar cells have much promise due to their low cost of manufacturing (as compared to silicon based solar cells), increased flexibility, low weight, and their cell transparency. In this study we investigate the possibility of performance enhancement of organic solar cells by the addition of silver nanoparticles as well as cadmium oxide. The effects on the performance of organic solar cells with the addition of silver nanoparticles was examined through the addition of 5, 10, 20, and 30 nm Ag-NPs within the structure of poly(3-hexylthiophene) (P3HT) and [6,6]-phenyl C60 butyric acid methyl ester (PCBM) based devices. It was found that in general the addition of silver nanoparticles improved the overall performance of the devices with the 5 and 10 nm nanoparticles providing the greatest improvement in performance. Additionally, cadmium oxide was tested as a buffer layer for the organic solar cells, replacing the poly(3,4-ethylenedioxythiophene) polystyrene sulfonate (PEDOT:PSS) that is normally used in organic solar cells.

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