**Polymer Based Solar Cells**

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The purpose of my research was to study and fabricate solar cells while using polymer on both plastic (flexible) and glass substrate. Polymer based solar cells include a polymer (donor and acceptor material) layer with HTL (hole transport layer ) and electron transport layer or buffer layer. The role of HTL and electron transport layer is to facilitate the charge transport of the respective carriers.

I started my experiment using glass (FTO) as well as flexible ITO (PET) sheets as substrate. For the active layer of solar cell I have used blend of P3HT: PCBM [poly (3-hexeylthiophene): 6, 6-phenyl C71-butyric acid methyl ester] with different ratios of P3HT: PCBM. I have used drop casting as well as spin coating for depositing the polymer layer on the substrate while using PEDOT:PSS[poly(3,4-ethylenedioxythiophene):poly(styrene sulfonate)] layer as a HTL and TiO2 layer as buffer layer. Throughout this summer I worked with different ratios of the polymer blend and different annealing conditions.

My conclusion about this work is the thickness of polymer layer has significant effect on the device performance as both absorption and current goes up. The ratio of P3HT: PCBM also plays a major role. The annealing and the ambient also play an important role. For my experiment the best device was 1:1 ratio at 110 °C for 10-15 minutes. Though I worked in air as ambient I was able to get fairly good current and working device on flexible and glass substrate.

During the program I learned about fabrication of solar cell, and how to analyze the device by finding IV curves. I gain real good understanding about solar cell fundamentals. The skills and training I earned during this summer will definitely be helpful in promoting the science education and projects in high schools.