4-2015

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**Organic Solar Cell At Room Temperature**

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EGN 403 - Professor James Masi

**Problem Statement**

Organic electronics have become of great interest in the field of materials science research due to the potential for flexible electronic devices and low cost technologies. Difficulties emerge with creating a stable and efficient device, while still maintaining a simple and room-temperature production process.

**Design Process**

1) Glass ITO  
2) PEDOT-PSS

3) Polyaniline  
4) Active layer- P3HT + Perylene

5) Silver Anode

**Background Research**

- **Layers of the Cell:**
  - Glass , ITO
  - PEDOT:PSS= HTL/ buffer
  - PANIN- interfacial layer
  - P3HT-Perylene= active layer
  - Cathode

- **Factors that Limit Solar Cell Efficiency:**
  - Defect - recombination
  - Energy loss - heat
  - Reflection
  - Electron affinity

**Abstract:** With the advent of relatively stable organic semiconductors and graphene (or other nanotube or fullerene morphologies), it is possible to fabricate photovoltaic cells at near room temperature. By stacking these cells, devices of reasonable efficiencies >5% can be fabricated.

**Figure 1** Spectrophotometer results of cell materials  
**Figure 2** Sample of energy levels in a solar cell

**Results**

- Focus on increasing layer stability
- Paste spread to help improve stability
- Spectral response of diode
- Barrier layer

**Solar Cell Standards:**

EN 50641: Solar Cells- Information on silicon solar cells
IEC 60904(1-10): Photovoltaic Devices-IV characteristics, computation and testing, spectral response
ASTM E1143, E1125: Cells Testing Parameters, Calibration Using Tabular Spectrum
IEC 61215, 61777, 61646, 61730: Design qualification, power generation, type approval, safety qualifications
JRC ISSPRA 503, IEEE 1513, ASTM E1303: Test Procedures for silicon devices, qualification of devices, standard methods in various environments
ASTM E1799, E1802, E2047: Visual Inspection Standards, Mechanical Integrity

**References:**


**Acknowledgements:**

I would like to thank Chad Seeley for his help in the lab. Also thanks to Dr. Masi for all of his guidance and support throughout the project.