I. Organic

Organic photovoltaic cells (OVC) consist of conductive organic polymers and molecules. The organic polymers are sandwiched between two electrodes, with one of them being transparent in order for the light to go through. The first OVC design was based on the traditional p-n junction. It delivered a low power conversion efficiency (PCE) of 1.1%. Later, the bulk-heterojunction (BHJ) design was developed. This design reduced the distance between donor and acceptor in the layer, allowing a higher PCE.

The biggest advantage for organic photovoltaic cells is the low production cost due to the low material and substrate cost and to the ease of printing and fabrication. However, the power conversion efficiency (PCE) is currently only up to about 6.1%-7.9%, which is not enough to meet realistic needs. The PCE needs to reach near 10% in order to effectively market organic photovoltaic cells. The biggest challenge in increasing the PCE is the large band gap of most organic material. Fortunately, there is a vast variety of molecules and polymers to work with, providing many different electronic and optical properties to choose from.

Some advantages of using organic photovoltaic cells include:

- Simple fabrication process
- Lightweight
- Flexibility
- Low-cost of organic material
- Ease of printing
- Vast variety of molecules to work with
- Potentially strong optical absorption

Some disadvantages of using organic photovoltaic cells include:
• Short lifetime
• Low stability
• Low efficiency
• Degrades upon exposure to air; Requires effective encapsulation

References
