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Organic Photovoltaic Solar Cells using Graded Heterojunction Technology

Photovoltaic Organic Solar Cells using Graded Heterojunctions are Less Expensive and More Efficient

IP Status: Issued US Patent; **Application #:** 12/783,308

Organic Photovolataic Solar Cells can Power Personal Electronics

Organic photovoltaics , a solar cell technology, can provide flexible, wearable, lightweight and low cost solar panels for personal electronics. Organic solar cells have lower production costs because the cells are printed onto a substrate. Commercially available organic solar cells posses less than 3 percent power conversion efficiency (conversion of light into electricity, a higher power conversion efficiency is better). By comparison, the latest experimental silicon-based solar cells obtain power conversion efficiencies of up to 40.7% with commercial solar cells possessing power conversion efficiencies of less than 20 percent. The limitation of silicon-based solar cell technology is an extremely high manufacturing and material cost.

Graded Heterojunction Combines Two Technologies

The graded heterojunction technology can increase the efficiency of organic solar cells and has the potential to dominate the estimated 1 billion dollar market for organic solar cell devices. The architecture combines the small electron distance of the dispersed heterojunction architecture (decreases the interference with the solar cell material) and the charge gradient of bilayer technology (decreases the backflow of electrons). Since the manufacturing process can be performed in a single pass, this architecture has the potential to lower the production cost while increasing the power conversion efficiency of organic solar cells. Four percent power conversion efficiency has been demonstrated with more research conducted to improve the efficiency.

BENEFITS AND FEATURES OF PHOTOVOLTAIC ORGANIC SOLAR CELLS

- Power conversion rates of 4% with the potential to be an underlying architecture for future organic photovoltaic solar cells
- The combination of a bilayer and dispersed heterojunction architecture greatly simplifies the fabrication process and can reduce manufacturing costs.

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