USF Available Technologies

Technology Transfer Office

Piezoelectric Based Solar Cells

Researchers at the University of South Florida have invented a solar cell that employs the piezoelectric effect to enhance the energy conversion efficiencies.

The two main challenges in the development of better solar cell technologies are the cost and the energy conversion efficiency of the devices. To address these challenges, different materials and structures have been tested over the past few decades. In order to achieve high energy conversion efficiency in a device, inventors focus on the energy levels in the Electron Transport Layer (ETL), the energy barrier between ETL, and the photoactive layer.

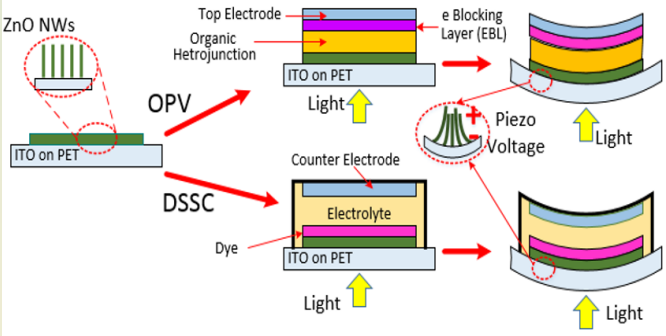
In thin-film and electrochemical solar cells, the energy barrier at the interface between different layers is a limiting bottle-neck for efficient charge collection in the devices. To achieve high efficiency, innovators are engineering new materials and interfaces. However, changing the materials and structures can affect the overall performance of the device.

The technique developed by USF inventors employs a piezoelectric material in the structure of the devices. The invention modifies the energy barrier at the interface by using either external mechanical forces or initial stress in the layer. Modifying the energy barrier can enhance the charge transfer from the photoactive layer, increasing the energy conversion efficiency in the solar cells. This piezoelectric photovoltaic device is applicable to the development of a more efficient and effective solar cell technology.

ADVANTAGES:

- **Increases energy conversion efficiency**
- **Flexible in using internal or external static stress to modify energy barrier**
- **No need of dynamic stress**

Enhanced Energy Conversion Through Piezoelectric Introduction



Using the Piezoelectric Effect of ZnO NWs in Modifying the Energy Barrier in OPVs and DSSCs

Tech ID #15A036 **Patent #: 9,911,540**

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