Scalable Synthesis of Nanostructured Dye-Sensitized Solar Cells

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Scientific Achievement:

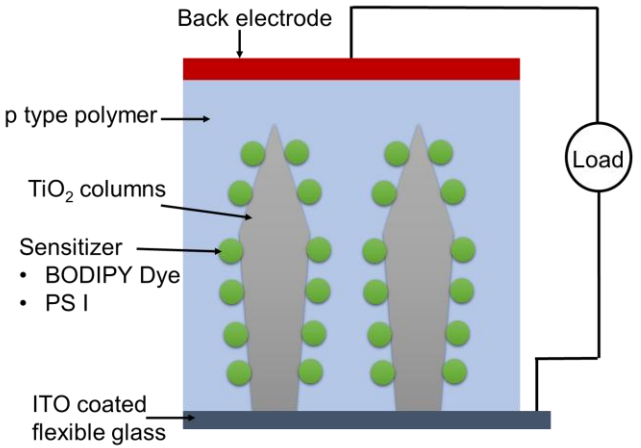
Developed single-step, atmospheric pressure synthesis of single-crystal, one-dimensional nanostructured thin films as absorber material. Developing a new hybrid donor systems for enhanced photon harvesting and minimizing recombination.

Significance and Impact:

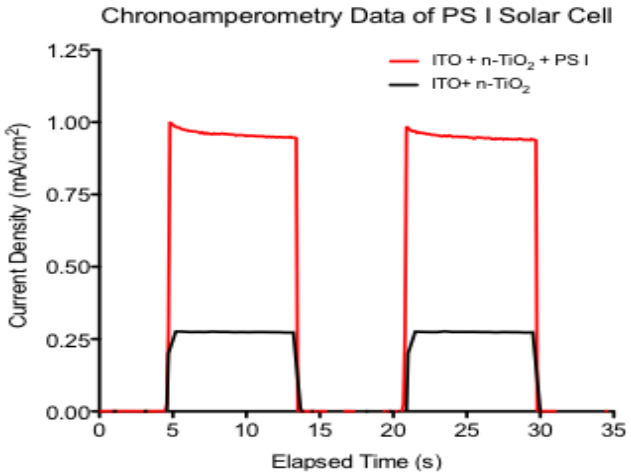
Low-cost flexible solid-state solar cells with reasonable efficiencies and capability to perform in low light conditions.

Research Details:

- One-dimensional single-crystal TiO_2 nanostructures were synthesized on ITO-coated glass substrates using a single-step aerosol chemical vapor deposition (ACVD) process.
- Molybdenum carbide and iron nitride-based nanostructured counter-electrodes synthesized.
- Structurally modified new BODIPYs with anchoring subunits synthesized to achieve enhanced absorption on TiO_2 surfaces.
- Evaluated the photoelectrochemical performance of a photosystem I-based solar cell using nanostructured TiO_2 synthesized by the ACVD process.



Schematic of the flexible solid-state solar cell



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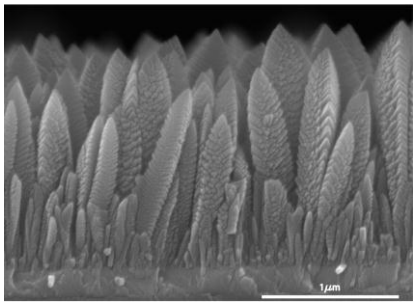

SEM image of the columnar TiO_2 nanostructure

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PV-03, Tasks 1&2