CSUVENTURES
Innovation at Work

Colorado State University

Cost-Effective Replacement for Iodide in Dye-Sensitized Solar Cells

Dye-sensitized solar cells (DSSCs) are used to create electrical energy from sunlight. The cell has three components: the cathode, the photoanode, and the electron transfer medium (ETM). The ETM commonly contains iodide salts and other components. Current forms of DSSCs are noted for their durability and cost effectiveness; however, the volatile and corrosive nature of the salts used in the cell limit the materials that can be used to construct the cell. Cathode material is limited to expensive metals such as titanium and platinum, instead of cheaper metals like gold, copper, aluminum, or nickel. Cell leakage is also a problem because of the corrosive effects of the salts, and can lead to failure of the DSSC. The problems of cell leakage and limited construction materials associated with iodide salt DSSCs need to be resolved.

Researchers working at Colorado State University and the University of Ferrara have created a new metal complex-based ETM that overcomes the problems of traditional DSSCs. The new ETM has been demonstrated to be 80 percent as efficient as traditional iodide salt mediums in otherwise identical cells. Furthermore, the new ETM is less corrosive than traditional iodide ETMs. It is also more transparent than iodide-based mediums.

This new metal-based electron transfer technology reduces the compatibility issues between the cell material and the ETM: cell leakage issues can be decreased, and new structural materials, once considered incompatible with the ETM, can also be used to construct the cell. Additionally, cheaper metals can be used as the cathode, reducing the cost of the cell. The new ETM allows for the possibility of more transparent cells that could be configured differently, possibly stacked, to increase power output. The possibility even exists of creating a polymer from the new ETM that could be used to create a solid-state device.

Patent Information

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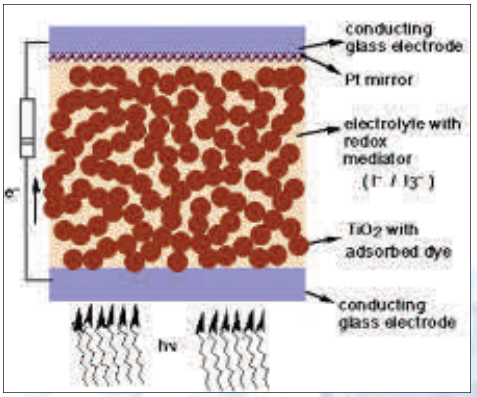

Features and Bene-

- Potentially cheaper than other forms of photovoltaic energy production
- Non-corrosive and non-volatile
- Enables alternative cell configurations
- Wider range of cell construction materials possible
- Longer product life than iodide solar cells
- Suitable for both outdoor and indoor/low light applications

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