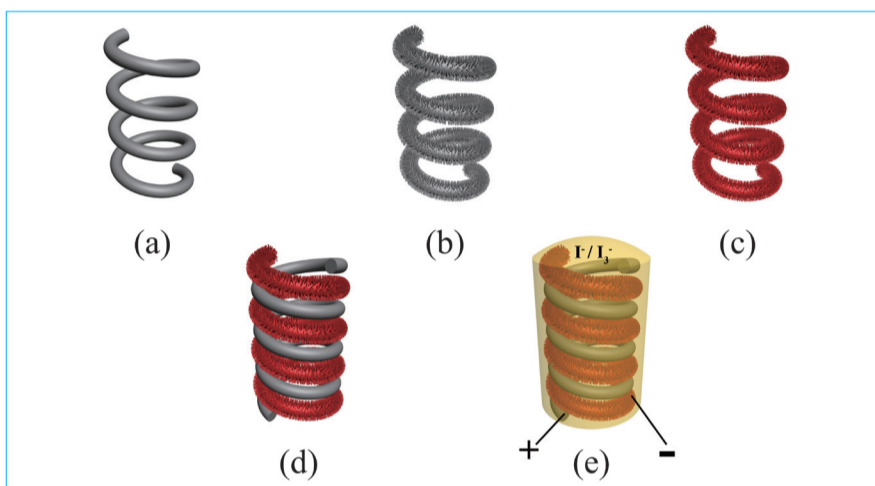


高效低成本染料敏化的太陽電池技術

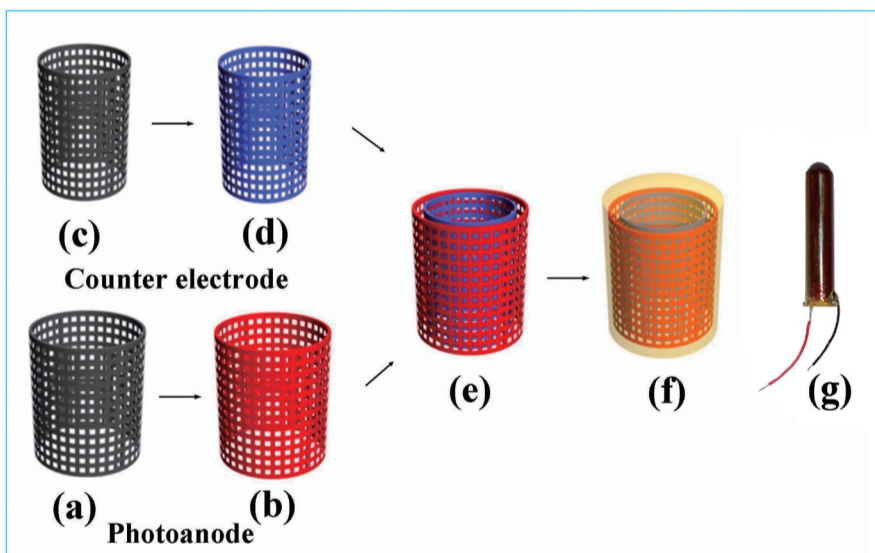
Development of High Efficiency Low-cost Bionic Dye-sensitized Solar Cells

一種應用於第三代太陽電池的新技術
A new technology for the third generation solar cells

染料敏化太陽電池由於其低廉的成本、簡便的製作工藝以及相對高效的光電轉換效率，一直被業界認為是最有希望替代傳統矽基太陽電池的候選者。香港理工大學可再生能源實驗室通過借鑒仿生學的觀點，設計研發了具有新型結構的染料敏化太陽電池，該電池可以充分利用來自立體空間的光線。同時通過與原位生長技術相結合，在電池的基底直接生長出諸如納米管、納米線等一維納米材料，這樣可以大幅度增強電子的收集效率。同傳統的平板結構染料敏化太陽電池相比，仿生狀染料敏化太陽電池顯示出卓越的光伏特性，甚至在暗光的條件下一樣可以發電。



DNA狀染料敏化太陽電池的製作步驟
Fabrication process of the DNA-like DSSC



立體雙層網狀染料敏化太陽電池的製作步驟
Schematic flow diagram for the fabrication of 3-D double-deck mesh like DSSC

Dye-sensitized solar cell has been treated as the most promising alternative to traditional silicon-based solar cell mainly due to its low manufacture cost, easy fabrication process and relatively high conversion efficiency. In this project by utilizing the bionic idea, we developed new structures of the dye-sensitized solar cells which could fully utilize spatial sunlight. Combined with the in-situ growth technique, 1D nano-materials such as nanowires or nanotubes were directly synthesized from the substrate of the device to increase the charge collection efficiency. Compared with the flat-type device, the bionic dye-sensitized solar cell showed superior photovoltaic parameters even under dim light.

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專利申請編號及國家：201010005219.2 (中國), 201010233899.3 (中國)

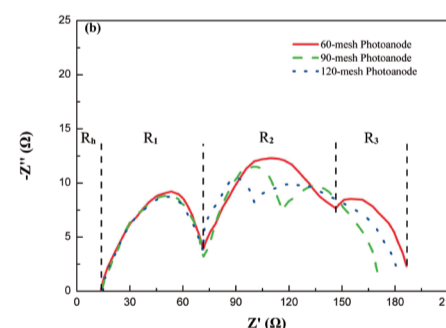
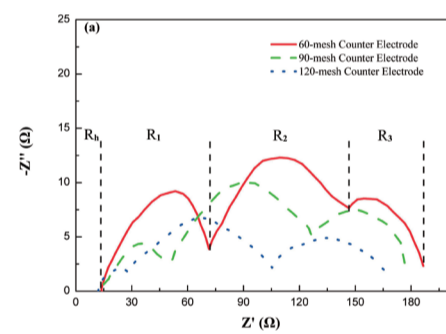
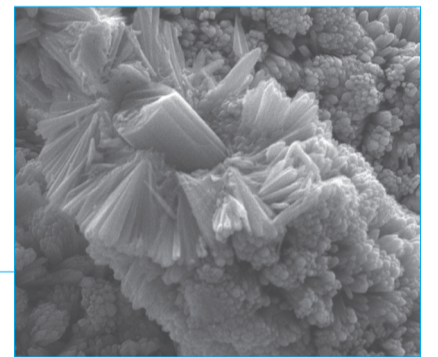
特色與優點

- 仿生狀的結構可以充分利用空間的陽光
- 通過採用金屬為基底可以減少電池的內阻
- 可以作為微型電源
- 由於採用一維納米材料，具有高效的電子收集效率
- 簡單的製作工藝

應用

- 光伏建築一體化
- 光伏電站
- 微型電源

以導電石墨纖維為基底表面原位生長氧化鈦納米棒
光陽極的掃描電鏡圖
SEM image of the photoanode based on carbon
graphite fiber covered with oriented TiO₂ nanorods



立體太陽電池在不同入射角的光線照射下的光伏特性
The photovoltaic parameters of the 3-D DSSC illuminated in different angle of the incident sunlight.

Patent Application No: 201010005219.2 (P.R.China), 201010233899.3 (P.R.China)

Special Features and Advantages

- The bionic structure could fully utilize the spatial sunlight
- The internal resistance of the device could be reduced by using metal substrates
- Special application such as micro power
- High electron collection efficiency due to the application 1D nano-materials
- Easy fabrication process

Applications

- Building integrated photovoltaic
- Photovoltaic power stations
- Micro power