



# 高分散可絲網印刷納米複合漿料的研發及其在高效染料敏化太陽電池及自清潔玻璃中的應用

## High Dispersed Screen-Printable Nanocomposite Paste for High-Performance Dye-sensitized Solar Cells and Self-Cleaning Glass

### 一種用於綠色能源用的新型納米複合漿料

### A novel nanocomposite paste for green energy application

專利申請編號及國家: ZL201010564588.5 (中國)

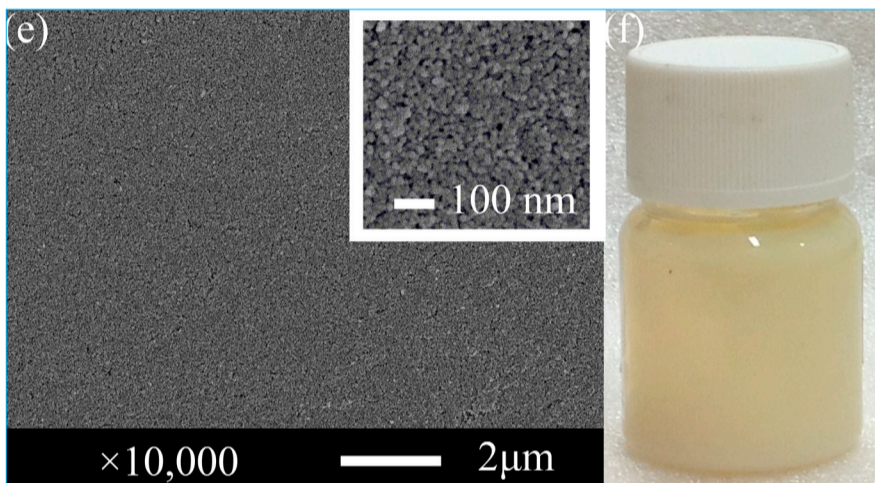
#### 特色與優點

- 該漿料所製備的塗層具有高的納米粒子分散度，因此所製備的薄膜具有較高透過率，可以增加染料敏化太陽電池的光捕捉效率
- 該漿料也可以用於在玻璃表面製備自清潔塗層，從而利用雨水可以輕易的將表面的灰塵沖洗掉。

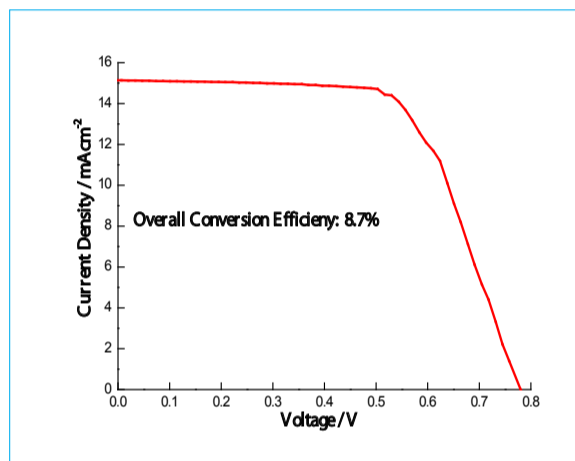
#### 應用

- 這個全新的納米複合漿料不僅可以應用在高效染料敏化太陽電池的光陽極，也可以用於製備自清潔玻璃。

在本項工作當中我們發明了一種高分散納米複合漿料，其可通過快捷的絲網印刷的方式製備出高透明的多功能塗層。該塗層的特色在於其內部半導體納米複合粒子的分散度極高，所製備出的薄膜可以極大降低對光的散射，有較高的透過率，因此可用於製備高效染料敏化太陽電池的光陽極。此外，由於漿料當中的半導體納米複合粒子具有卓越的光催化及防靜電特性，因此其也同樣適用於製備玻璃表面的自清潔塗層。該自清潔塗層經過陽光活化，具有超親水性，沉積在表面的灰塵可以被雨水輕易沖洗乾淨。此外，空氣當中的有機物污染物也可以通過納米粒子光催化分解掉，對人體健康有益。該漿料的製備方法廉價快捷，適合於大規模產業化。



本發明所研發漿料的掃描電子顯微鏡圖及實物圖  
SEM images and the photographs of the as-prepared nanocomposite pastes



採用所研發漿料製備的染料敏化電池光電轉換效率測試曲線  
J-V characteristic of the dye-sensitized solar cells using the nanocomposite paste



採用所研發漿料製備的自潔玻璃  
The self-cleaning glass fabricated by the nanocomposite paste

Patent Application No.: ZL201010564588.5 (China)

#### Special Features and Advantages

- The developed paste could be used to fabricate high transparency coating for dye-sensitized solar cells due to the enhancement of the light-harvesting efficiency.
- The developed paste could also be used to prepare self-cleaning coatings on glass which can easily brush away the dust by the rainwater.

#### Application

This innovative nanocomposite paste can not only be used as the photoanode of high-performance dye-sensitized solar cells, but also as self-cleaning paste of glass.

In the present work we have developed a new high dispersed nanocomposite paste, which is suitable for the facile screen-printing process to produce high transparent multifunctional coatings. As the coatings have extremely high dispersion of the internal semiconductor nanocomposite particles, it could inhibit the scattering effect and increase the transparency of the film. Consequently, it could be used to fabricate the photoanode of high-performance dye-sensitized solar cells. Besides, due to the superior photocatalytic features and antistatic characteristics of the coating, it is also suitable to prepare self-cleaning coatings on glass. The surface of the coating via sunlight-activated is superhydrophilic, which is easy to brush away dust by rainwater. Moreover, the coating also plays a role as a cleaner to depredate the organic compounds in the air by a photocatalytic process, which is beneficial to human health. The fabrication process of the paste is cheap and facile, easy for industrialization.

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