

Why is self-cleaning of solar cell panels important?

In addition to soiling, two other important parameters, i.e., reflectivity and durability of the coatings, contribute greatly to decreasing the efficacy of solar energy conversion. Hence, self-cleaning of solar cell panels is as critical as harnessing solar energy for its efficient utilization [2,23,24].

What is a self-cleaning photovoltaic (PV) panel?

Self-cleaning photovoltaic (PV) panel. 2211-3398/2022 Elsevier Ltd. All rights reserved. Dust is a small dry solid particle in the air that is emerged from natural forces (wind, volcanic eruption, and chemical) or man-made processes (crushing, grinding, milling, drilling, demolition, etc.) with its diameter ranging from 1 to 100 μm .

Can transparent self-cleaning improve solar panel conversion efficiency?

Researchers worldwide have attempted to develop transparent self-cleaning for PV panel applications to improve its conversion efficiency. In 2016, Xu et al. have invented the self-cleaning coating on solar cell glass by using spin-coating and reactive ion etching.

Which nanomaterial can be used for self-cleaning coating on solar PV panels?

Apart from SiO_2 nanomaterial, titanium dioxide (TiO_2) is another well-known nanomaterial that can be used for self-cleaning coating on solar PV panels as it possesses both hydrophilic and photocatalysis properties. The developed TiO_2 /silane coating possesses the WCA below 10° .

Are self-cleaning solar panels a good idea?

Micro-patterned, self-cleaning solar panels can maintain their efficiency with little resources or human intervention. The efficiency of solar panels, often built on arid landscapes, can be reduced by up to 40% as dust accumulates on the panels.

Why is self-cleaning coating important in PV panel industry?

The presence of curing agent has increased the crosslinking and hardness of coating system where the WCA of coating reduced to 158° ; after impacting with 2000 cycles of bending stress and cross knife-scraping test. With the progressive development in nanotechnology, the demands on self-cleaning coating increasing among the PV panel industry.

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