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Design and Fabrication of CNT-Silicon Solar Cells

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ABSTRACT

Incorporating carbon nanotubes (CNTs), graphene or performing polymers with classic silicon wafers causes guaranteeing solar cell architectures with quickly improved power alteration efficiency until just lately. Here, we survey CNT-Si junction solar panels with efficiencies attaining ١٥٪ by finish a TiO_2 antireflection covering and doping CNTs with oxidative chemicals, under air mass (AM ١،٥) brightness at a calibrated power of ١٠٠ mW/cm^2 and a dynamic device section of ١٥ mm^2. The TiO_2 covering significantly inhibits light reflectance from the Si surface, leading to much increased short-circuit current (by ٣٠٪) and exterior quantum efficiency. Our method is easy, well-controlled, and incredibly effective in increasing the performance of CNT-Si solar panels.

Keywords: Solar Cell , CNT , TiO_2

١. INTRODUCTION

The light-to-electricity transformation in a solar panels consists several key steps, including light absorption, charge separation and carrier collection. The light absorption step determines how much small fraction of event photons can be utilized by the semiconductor and the excitation of charge carriers, therefore straight affects the exterior quantum efficiency and cell efficiency. For planar substrates such as polished Si, light reflection from other surface could be up to ٣٦٪, leading to substantial energy loss in the light absorption stage[١].
Antireflection constructions such as vertical semiconducting nanowire arrays produced on or etched from a Si substrate[٢], nanodome-like amorphous Si layers[٣], and patterned Si nanocones[٤] with ideal aspect ratios have been reported recently, and demonstrated effective light trapping and reflection reduction for the devices. Those approaches generally created a