Researchers propose novel multilayer structure to improve stability of passivating contact solar cells

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Efficient separation and collection of photogenerated carriers through the formation of asymmetric electron and hole transport channels is one of the key issues for crystalline silicon (c-Si) solar cells and other types of photovoltaic devices.

Silicon heterojunction solar cells based on MoO_x (x stability due to poor thermodynamic stability of MoO_x.

A research team led by Prof. Li Dongdong at the Shanghai Advanced Research Institute (SARI) of the Chinese Academy of Sciences and their collaborators reported a novel stacked structure to improve the stability of c-Si solar cells.

The study was published in *Advanced Functional Materials* on August 26.

The research team introduced a SiO_2 tunneling passivation layer at the MoO_x/c-Si interface to suppress the redox reaction caused by the direct contact between MoO_x and c-Si, which keeps the work function of MoO_x at a relatively high level.

An ultra-thin $V2O_x$ layer was deposited on the surface of MoO_x film to improve the stability of the heterojunction structure in air and its resistance to sputtering damage.

At the same time, the indium tin oxide (ITO) layer was fabricated at the $V2O_x$/Ag interface, which effectively inhibited the migration of metal ion, and finally constructed a tandem structure of c-Si/SiO_x/MoO_x/$V2O_x$/ITO/Ag, with power conversion efficiency (PCE) of 20.0% and improved stability.

This work solved the stability issue of p-Type silicon solar cells with full area Si/MoO_x/Ag contacts by introducing stable oxide layers on both sides of MoO_x to prevent the interfacial reaction and evolution.

It provides a new approach to the study of compound/c-Si passivated contact heterojunction solar cells, which can be extended as a universal method to improve the efficiency and stability of heterojunction solar cells and other types of optoelectronics.

More information: Shuangying Cao et al. Stable MoO X -Based Heterocontacts for p -Type Crystalline Silicon Solar Cells Achieving 20% Efficiency, *Advanced Functional Materials* (2020). DOI: 10.1002/adfm.202004367

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