

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 V_2O_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 V_2O_x /Ag interface, which effectively inhibited the migration of metal ion, and finally constructed a tandem structure of c-Si/ SiO_x / MoO_x / V_2O_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](https://doi.org/10.1002/adfm.202004367)

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