Enhancing the Photostability and Efficiency of Tin-Lead Perovskite Solar Cells Using Nickel Oxide and Self Assembled Monolayers

Alammari, Muhanad (School: Riyadh School for Boys and Girls)

Tin Lead Perovskite solar cells (TLPSCs) have grown to an unprecedented power conversion efficiency (PCE) rate exceeding 23%. However, the main drawback is that TLPSCs are unstable and their performance decline over time. The use of NiOx as hole transport layer (HTL) has shown promising results to improve the stability of TLPSC. However, the work function of NiOx does not align properly with the TLPSC valence band, which results in inefficient charge extraction and low PCE. To improve this energy alignment, we modified the NiOx work function with three different self-assembly monolayers (SAMs). The NiOx modification with MeO-2PACz resulted in an enhanced power conversion efficiency of 15.9%, in comparison to 14.4% of the control device. This work provides a promising strategy towards more stable and efficient TLPSC.

Awards Won: