Synthesis and Characterization of Tin dioxide (SnO_2) Electron Transport Layer for Next Generation Flexible Solar Cells and Modules

Noor us Saba[1], Muhammad Saad Rehan[2], Zia Ullah[2], Adnan Daud Khan[2], Muhammad Noman[2]

[1]Shaheed Benazir Bhutto Women University, Peshawar

[2]U.S.-Pakistan Center for Advanced Studies in Energy, University of Engineering and Technology, Peshawar

The electron transport layer (ETL) is one of the significant charge transport layers in the perovskite solar cells (PSCs). Tin dioxide (SnO_2) demonstrates exceptional potential as an electron transport layer (ETL) in low-temperature processed perovskite solar cells, offering high electron mobility and compatibility with the flexible substrates. In this work, we report an easy and cost-effective method for synthesis of SnO2 colloidal dispersion through refluxing process at 85^{o}C for three hours. The synthesis was followed by deposition of SnO_2 on glass substrates through spin coating. The deposited layers were tested for structural and optical properties using X-ray Diffractometer and Spectrophotometer. The high intensity diffraction peaks at 29^{o} confirm the crystalline structure of the synthesized ETL. Further, the transmittance of around 90% in the visible range (400-800nm) clearly depict the satisfactory optical performance. The significance of this work lies in the fact the SnO_2 has been synthesized at temperature below 200^{o}C, thus can lead to the development of next generation flexible solar cells and modules.