Numerical exploration of MASnI3 based PSCs with different ETLs using SCAPS-1D

Ipsita Mohanty1, S Mangal2,\*, S Jana2, and Udai P Singh3

1Department of Physics, Dharanidhar University, Keonjhar, 758001

2School of Applied Sciences, Kalinga Institute of Industrial Technology (KIIT), Bhubaneswar, India,

3School of Electronics Engineering, Kalinga Institute of Industrial Technology (KIIT), Bhubaneswar, India

Corresponding Author: sutanufpy@kiit.ac.in

**Abstract**. The article describes the synthesis of methyl ammonium tin iodide (CH3NH3SnI3) through chemical route and the investigation of its optical properties using a UV-vis spectrophotometer. Using the absorption file of CH3NH3SnI3 from the experimental data, numerical simulation of hole transport layer free perovskite solar cells (PSCs) has been conducted with various electron transport layers (ETLs) using SCAPS-1D software. The PSCs were constructed with the structure Au/CH3NH3SnI3/(TiO2/ZnO/CdS/SnO2/WS2)/Zno:Al. Key parameters like thickness and defect density has been optimised to achieve high PSC efficiency. Among the ETLs studied, CdS proved to be the most promising one with efficiency of 16.84 %.