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Comparative Simulation of the Perovskite Solar Cell

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Introduction

Photovoltaic solar cells are the most important device of renewable energy, Silicon based junction solar cells present efficiency lower than 25%. Therefore, researchers switch to new materials to improve the solar cell performance. In recent years perovskite materials have aroused great interest in optoelectronic and microelectronic devices because of their excellent performance, Low production cost and high absorption. Among these materials, the methylammonium tin triiodide $CH_3NH_3SnI_3$, and: the Methylammonium lead halide $CH_3NH_3PbI_3$ which are considered to be ones of the best choices for photovoltaic applications, the efficiency of perovskite solar cell has been significantly enhanced from 5.44 % in 2014 [1] to 23.36 % in 2016 [2,3].

In this work, we simulated the characteristic of perovskitesolar cells; we studied the effect of the buffer layer thickness and doping on the photovoltaic parameters such as open circuit voltage, short circuit current, fill factor andefficiency.

Theoretical Study

The simulation was performed using SCAP's 1D simulator.

Results and Discussion

The simulated structure is illustrated in Figure 1, the cell is consisting of TCO (transparent conductive oxide)/ZnO/perovskite on the top of HTM (Hole Transport Material) substrate.

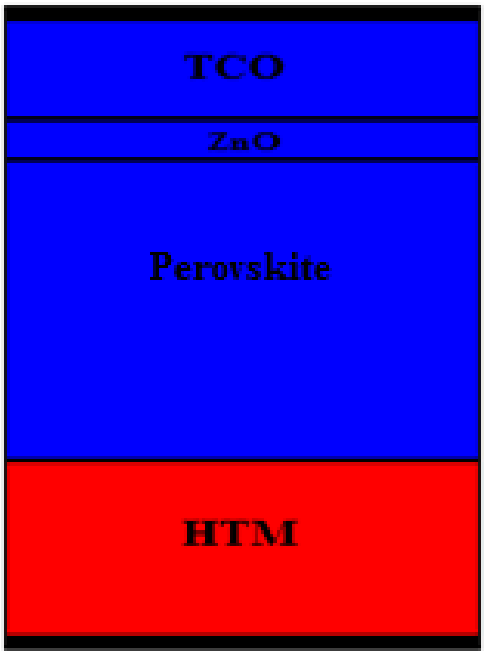

Fig1: Simulated solar cell structure.

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Conclusion

In summary, we have investigated simulation of perovskite solar cell, we have studied the effect of thickness and N-concentration of the active layer on the photovoltaic parameters such as open-circuit voltageVco, short-circuit current Jsc, efficiency η and fill factorFF, and we compared the performances of solar cells based on $CH_3NH_3SnI_3$and that based on $CH_3NH_3PbI_3$.

Acknowledgments

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