

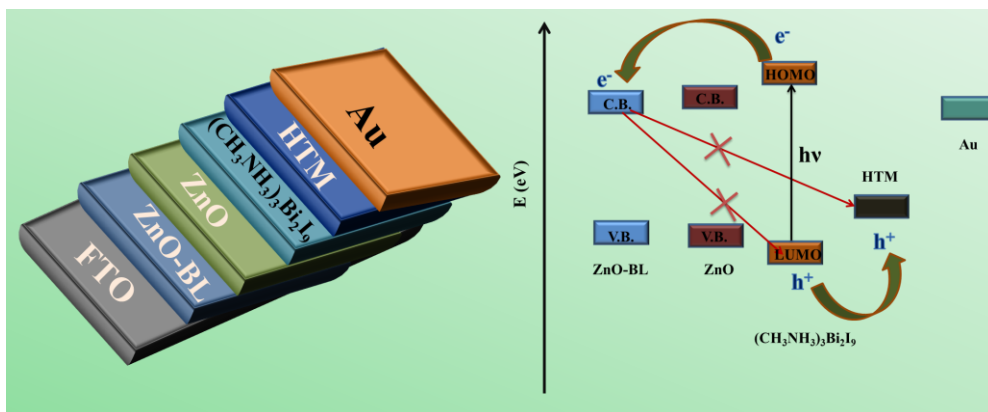
Poster Presentation
Inter-Disciplinary Explorations in Chemistry (I-DEC 2018)

Mg doped zinc oxide as promising electron transport layer for Pb free perovskite solar cells

Khursheed Ahmad^a, Shaikh M Mobin^{a,b,c,*}

^aDiscipline of Chemistry, ^bDiscipline of Biosciences and Bio-Medical Engineering and ^cDiscipline of Metallurgy Engineering and Material Science, Indian Institute of Technology Indore, Simrol, Khandwa Road, Indore 453552, India
(E-mail: xray@iiti.ac.in)

Abstract: Herein, we present thin films of antimony based hybrid perovskites $A_3Bi_2I_9$ (A: methyl ammonium) for photovoltaic applications. Their optical properties were investigated by using UV-*vis* spectroscopy and calculated band gap suggest their high potential for light absorption to be used in perovskite solar cells (PSCs).¹⁻³ These films exhibit higher stability up to 30 days under ambient condition which was investigated by using PXRD analysis. Further, we have synthesized magnesium doped zinc oxide (Mg@ZnO) flowers and characterized by using PXRD, FE-SEM and UV-*vis* spectroscopy. Subsequently, a lead free perovskite solar cell device was fabricated by employing $A_3Bi_2I_9$ perovskites and Mg@ZnO as light absorber and electron transport layer respectively. The PSCs device was fabricated under ambient conditions with a novel architecture (**FTO/ZnO-SL/Mg@ZnO/(CH₃NH₃)₃Bi₂I₉/spiro-OMeTAD/Au**) has shown excellent power conversion efficiency of 0.29%.



Scheme: Schematic diagram showing device architecture and energy levels of Pb free PSCs.

References and Notes:

1. Sutradhar, N.; Sinhamahapatra, A.; Pahari, S. K.; Pal, P.; Bajaj, H. C.; Mukhopadhyay, I.; Panda, A. B. Fabrication of Highly Sensitive and Stable Hydroxylamine Electrochemical Sensor Based on Gold Nanoparticles and Metal-Metalloporphyrin Framework Modified Electrode. *ACS Appl. Mater. Interfaces* **2016**, 8, 18173-18181.
2. Cha, M.; Da, P.; Wang, J.; Wang, W.; Chen, Z.; Xiu, F.; Zheng, G.; Wang, Z.-S. Enhancing Perovskite Solar Cell Performance by Interface Engineering Using CH₃NH₃PbBr_{0.9}I_{2.1} Quantum Dots. *J. Am. Chem. Soc.* **2016**, 138, 8581-8587.
3. Xing, J.; Yan, F.; Zhao, Y.; Chen, S.; Yu, H.; Zhang, Q.; Zeng, R.; Demir, H. M.; Sun, X.; Huan, A.; Xiong, Q. High-Efficiency Light-Emitting Diodes of Organometal Halide Perovskite Amorphous Nanoparticles. *ACS Nano* **2016**, 10, 6623-6630.