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Charge Carrier Dynamics in Perovskite Solar Cells Utilizing C60-SAM Passivated SnO2 Electron Selective Layer or Pb(SCN)2 Additive. NIRAJ SHRESTHA, CHANGLEI WANG, YUE YU, COREY GRICE, WEIQIANG LIAO, ALEXANDER CIMAROLI, University of Toledo, JING CHEN, Southeast University, DEWEI ZHAO, University of Toledo, ZHENHUA YU, PEI LIU, NIAN CHENG, XINGZHONG ZHAO, Wuhan University, KHAGENDRA BHANDARI, PAUL ROLAND, YANFA YAN, RANDALL ELLINGSON, University of Toledo
— Photoluminescence measurement was performed to study the effect of various electron selective layers in MAPbI3 perovskite. We observed that significant improvement in electron extraction can be achieved by modifying MAPbI3/SnO2 interface with C60-SAM. Greater PL quenching was observed in MAPbI3/C60-SAM/SnO2/FTO than MAPbI3/SnO2/FTO. PL dynamics were found to be shortened in case of MAPbI3/C60-SAM/SnO2/FTO. These results revealed that photogenerated electrons are extracted at faster rate in MAPbI3/C60-SAM/SnO2/FTO and thereby improving the cell performance. In a separate system, Cs incorporation in FAPbI3 has been found to suppress formation of yellow phase that improves thermal stability of FA1-xCsxPbI3. Enhanced grain size and higher intrinsic photogenerated carrier life time was correlated with the use of Pb(SCN)2 as an additive in FA1-xCsxPbI3, and incorporation of Pb(SCN)2 enabled improved power conversion efficiency.

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