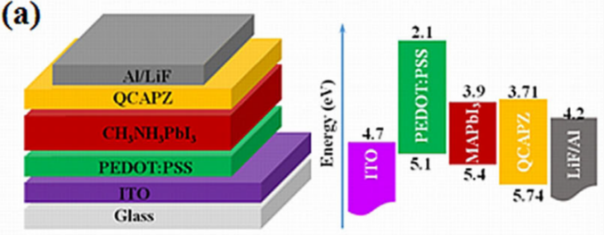
**Designing novel organic small molecular as electron transport layers for planar perovskite solar cells**

Qichun Zhang

School of Materials Science and Engineering, & Division of Chemistry and Biological Chemistry, School of Physical and Mathematical Sciences, Nanyang Technological University (NTU), 50 Nanyang Avenue, Singapore 639798, Singapore. E-mail: QCZhang@ntu.edu.sg. Website: http://www.ntu.edu.sg/home/qczhang/.

Compared to the traditional-architecture perovskite photovoltaics (n-i-p type), which use metal oxide as electron transport layers(ETLs) and organic semiconducting materials as hole transport layers, the fabrication of metal-oxide-free, solution-processed inverted perovskite solar cells (PSCs, Figure 1) is more desired because of low-temperatures and all-solution-based applications in future commercial PSC modules. In a typical configuration of inverted PSCs, the widely used ETL compound is the fullerene-based phenyl-C61-butyric acid methyl ester (PCBM), which currently is the best organic ETL material. The cost of this compound is very high, and the morphology and electrical properties are very sensitive to experimental conditions. In this talk, I will talk the recent progress of new organic ETL materials in my group for the replacement of PCBM in inverted PSCs. We believe that easily-accessible simple n-type small molecules are promising ETL candidates to further propel inverted PSCs to practical applications.



**Figure 1** the diagram of solution-processed inverted perovskite solar cells

**References**

1. Ning Wang, Kexiang Zhao, Tao Ding, Wenbo Liu, Ali Said Ahmed, Zongrui Wang, Miaomiao Tian, Xiao Wei Sun,\* **Qichun Zhang**\*, “Improving Interfacial Charge Recombination in Planar Heterojunction Perovskite Photovoltaics with Small Molecule as Electron Transport Layer”, **Adv. Energy Mater. 2017,** DOI: 10.1002/aenm.201700522.
2. Pei-Yang Gu, Ning Wang, Chengyuan Wang, Yecheng Zhou, Guankui Long, Miaomiao Tian, Wangqiao Chen, Xiao Wei Sun,\* Mercouri G. Kanatzidis\*, **Qichun Zhang**,\* “Pushing up the efficiency of planar perovskite solar cells to 18.2% with organic small molecular as electron transport layer”, **J. Mater. Chem. A. 2017,**5, 7339 – 7344.
3. Pei-Yang Gu, Ning Wang, Anyang Wu, Zilong Wang, Miaomiao Tian, Zhisheng Fu,\* Xiao Wei Sun,\* **Qichun Zhang**\* “Azaacene Derivative as Promising Electron Transport Layer for Inverted Perovskite Solar Cells”, **Chem. Asian J. 2016**, 11(15), 2135–2138.