

第667回 化学・物質工学セミナー

日時：平成28年3月15日（火）14:30~16:00

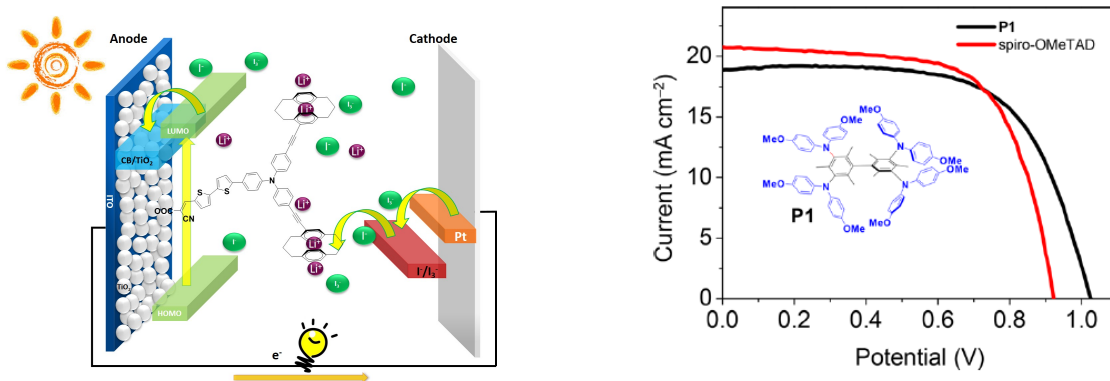
場所：工学部1号館2階 5番講義室

講演題目；Recent Progress of Organic Materials Applications in DSSC and Perovskite solar cells

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Abstract: Recently, we demonstrated the use of the nonconjugated chromophore of [2.2]PCP as a bridge unit and that a high energy barrier for charge recombination across a [2.2]PCP bridge may increase V_{oc} .²³⁻²⁴ In the current study, we designed an efficient intramolecular charge transfer in a D- π -A system. By using [3.3]paracyclophane ([3.3]PCP), we also designed a donor moiety that allows Li^+ capture of **33PCP-PSS**. It exhibits high interaction between lithium ions and [3.3]paracyclophane, resulting in low charge recombination and high open-circuit voltage (V_{oc}). When deoxycholic acid was used as the co-absorbent, the best device performance involved a short-circuit current (of $16.30 \text{ mA}\cdot\text{cm}^{-2}$, a V_{oc} of 0.71 V, and a fill factor of 0.64, and corresponded to an overall conversion efficiency of 7.4%.

A new class of hole-transport materials (HTMs) based on the bimesitylene core designed for mesoporous perovskite solar cells is introduced. Devices fabricated using two of these derivatives yield higher open-circuit voltage values than the commonly used spiro-OMeTAD. Power conversion efficiency (PCE) values of up to 12.11% are obtained in perovskite-based devices using these new HTMs. The stability of the device made using the highest performing HTM (P1) is improved compared with spiro-OMeTAD as evidenced through long-term stability tests over 1000 h.



Reference:

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2. Huang, C. H.; Chang, Y. J. *Tetrahedron Lett.*, **2014**, 55, 4938-4942.
3. Lin, Y.-D.; Ke, B.-Y.; Lee, K.-M.; Chang, S. H.; Wang, K.-H.; Huang, S.-H.; Wu, C.-G.; Chou, P. -T.; Jhulki, S.; Moorthy, J. N.; Chang, Y. J.; Liao, K.-L.; Chung, H.-C.; Liu, C.-Y.; Sun, S.-S.; Chow, T. J. *ChemSusChem*, **2016**, DOI: 10.1002/cssc.201501392R1.
4. Chiu, Y.-H.; Shibahara, M.; Hsiao, Y.-J.; Watanabe, M.; Wang, Z.-S.; Chang, B.-F.; Chang, Y. J. *Phys. Chem. Chem. Phys.*, **2016**, submitted.

セミナーオーガナイザー

岩尾正倫 (2681)