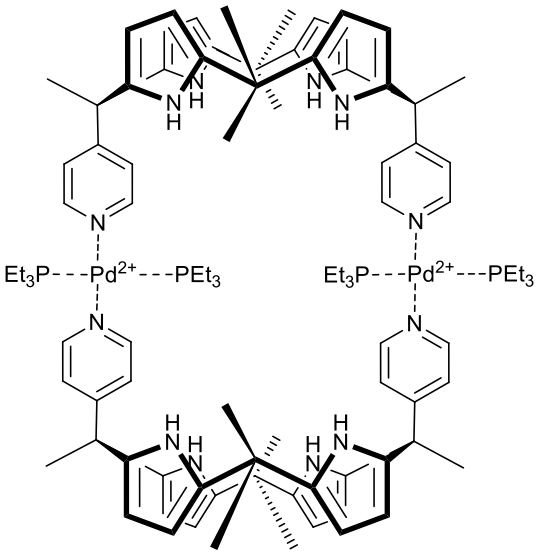
Miyaji Lab.

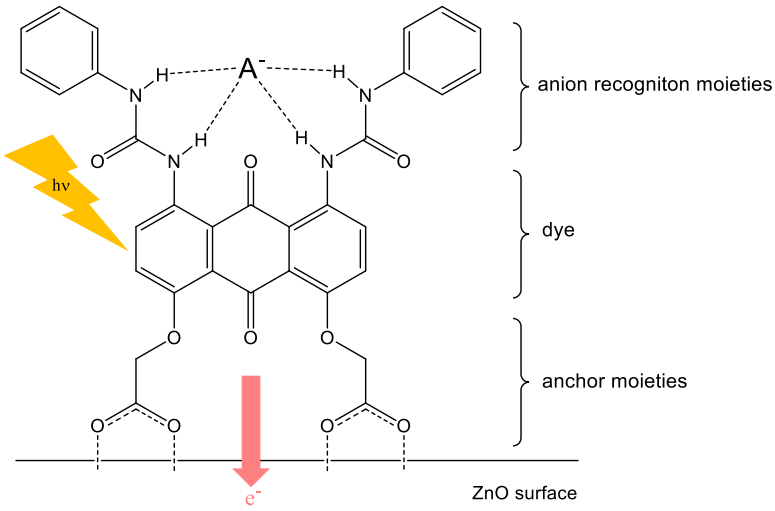
Resent research topics

1) Self-organisation of dipyridylcalix[4]pyrrole to the supramolecular cage for dicarboxylates.



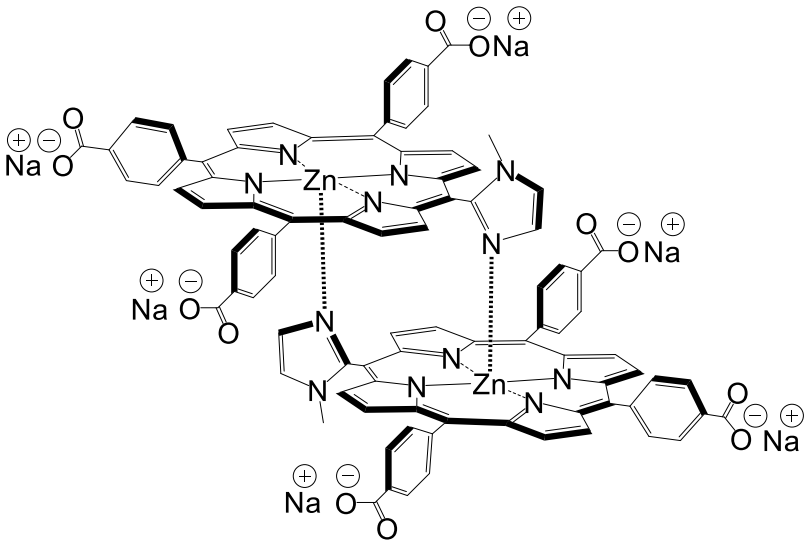
Cis- and *trans*-dipyridylcalix[4]pyrrole have been synthesized and the supramolecular cage has been formed by coordination of *cis*-dipyridylcalix[4]pyrrole to Pd(II). The cage molecule has been found to recognize a suberate selectively by hydrogen bonding of two calix[4]pyrroles. See, N. Kiriyama, M. Ebihara, T. Udagawa, H. Miyaji, *RSC Adv.*, **6**, 19794-19796 (2016).

2) A dye-sensitized solar cell using an anthraquinone bearing anion recognition moieties.



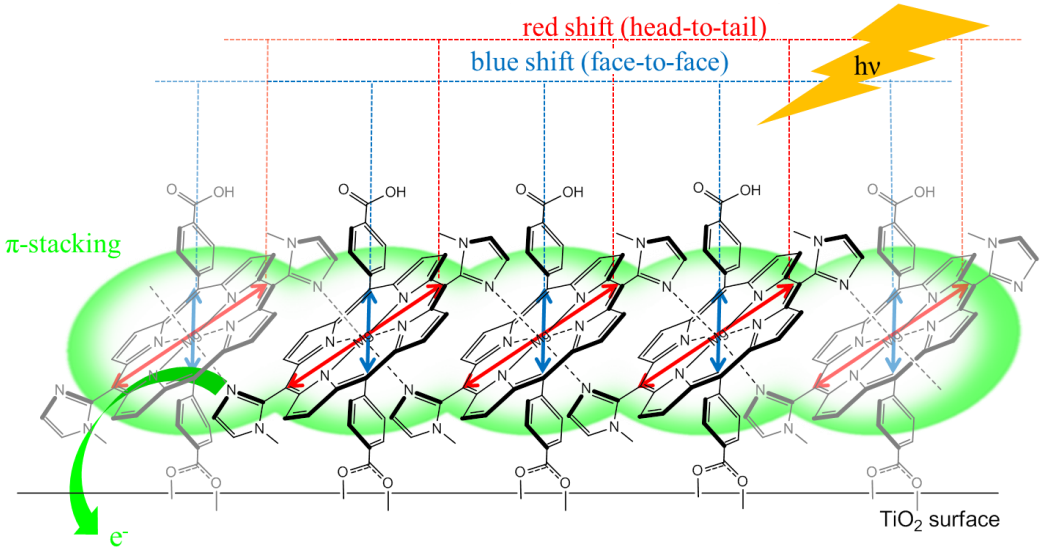
A dye-sensitized solar cell (DSSC) using an anthraquinone bearing two urea groups (as anion recognition moieties) and two carboxylic acids (as anchor moieties to ZnO electrode) has been prepared. The DSSC causes color changes and large red-shifts of IPCE by anion recognition. See, H. Miyaji, S. Sawada, J. Fujimoto, T. Yoshida, *Chem. Lett.*, **45**, 881-883 (2016).

3) Water-soluble supramolecular porphyrin dimer: self-organization of mono(imidazolyl)-substituted Zn porphyrin to a special-pair type dimer in water.



Tris(4-carboxylphenyl)-mono(N-methylimidazolyl)-substituted Zn porphyrin was synthesized as a precursor for water-soluble supramolecular porphyrin dimer. The dimer formation was performed in $NaHCO_3$ aq solution (pH 8.4) and phosphate buffer solutions (pH 7.4–9.0). The split Soret bands of Zn porphyrin observed in the absorption spectra clearly showed self-organization to a special-pair type slipped cofacial dimer *via* metal coordination of imidazole even in water. See, H. Miyaji, J. Fujimoto, *Tetrahedron Lett.*, **51**, 2979-2982 (2010).

4) Dye-sensitized solar cells using supramolecular porphyrin arrays inspired by π-stacking structures of photosynthetic light-harvesting complexes.



A slipped co-facial π-stacks of bis(4-carboxyphenyl)bis(1-methylimidazolyl)porphyrin Mg complex can be self-assembled onto TiO_2 surface as a light-harvesting core. The porphyrin array allows much favourable light-to-electricity conversion as compared to the monomer analogue in dye-sensitized solar cells. See, J. Fujimoto, K. Manseki, H. Miyaji, *Chem. Lett.*, **43**, 207-209 (2014).