

PHENAZINE AS ORGANIC PHOTOREDOX CATALYST FOR OXIDATIVE C-H CYANATIONS

Phung Phan Huyen Quyen, Adrian Prudlik, Esteban Mejia

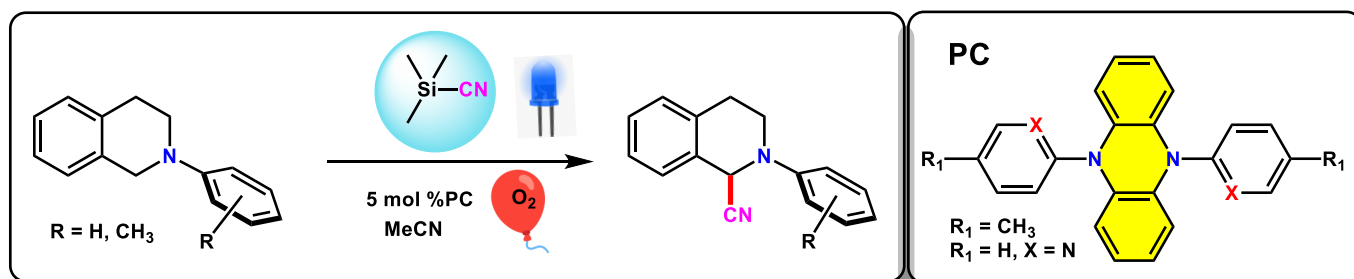
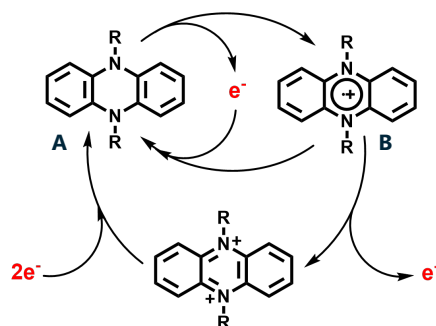
(Leibniz Institute for Catalysis (LIKAT), Albert-Einstein-Str.29a, 18059 Rostock, Germany)

phan.phung@catalysis.de

Organic photoredox catalysts are becoming potential alternatives to traditional metal-based systems, allowing cheaper, more sustainable processes. Among these, disubstituted phenazines have been gaining significant attention, as they have found application in several fields including homogeneous and heterogeneous catalysis ^{(1), (2)}, and the construction of organic batteries ⁽³⁾.

The synthesis, and photophysical and electrochemical characterization of several disubstituted phenazines were studied. Cyclic voltammetry analysis revealed the reversibility of the two oxidation processes in the phenazines through radical cationic and dicationic states, which could lead to new catalytic applications by harnessing the reactivity of their photo-excited states, which could act as strong oxidants.

As a model reaction to test our hypothesis, we have selected the oxidative C-H cyanation, also taking into account the increasing presence of CN-containing bio-active compounds and pharmaceuticals. From this perspective, we utilize disubstituted phenazine as the photoredox catalyst for the direct C(sp³)-H cyanation of tetrahydroisoquinolines with trimethylsilyl cyanide (TMSCN). Preliminary results show moderate to high yields for the facile synthesis of this class of molecules under very mild conditions, at room temperature and using oxygen (at atmospheric pressure) as the terminal oxidant.



Reference:

- (1) R.Brisar, F.Unglaube, D.Hollmann, H.Jiao, E.Mejia, *J.Org.Chem.* 2018, 83, 13481-13490
- (2) F.Unglaube, P.Hünemörder, X.Guo, Z.Chen, D.Wang, E.Mejia, *Helv. Chim. Acta* 2020, 103, e2000184
- (3) G.Dai, Y.He, Z.Niu, P.He, C.Zhang, Y.Zhao, X.Zhang, H.Zhou, *Angew. Chem. Int. Ed.* 2019, 58, 9902-9906