5,6-Bis(5-methoxythiophen-2-yl)pyrazine-2,3-dicarbonitrile (DPZ)

DPZ as a photoredox catalyst exhibits excellent photoredox activity in various photoredox reactions with the following catalytic features [1]:

- Purely organic, metal-free orange compound
- Absorption of the light within a wide range of the spectra
- Absorption maxima at 450 nm nicely overlaps the emission maxima of commonly used blue LED source of photons
- Catalytic performance of DPZ is similar/higher compared to commercially available and commonly used organic photoredox catalysts
- Very low catalyst loadings - 0.01 - 0.5 % (e. g. $Ru(bpy)_3^{2+}$ commonly 0.1 - 5 %)
- Capability to undergo photoinduced electron transfer via both oxidative and reductive quenching cycle
- No further interaction with the substrate/products of the catalyzed reactions
- Easy regeneration after reaction cycle
- Possible application in the photoredox flow reactors

Figure 1: structure of DPZ catalyst, bulk, and HOMO/LUMO localization.

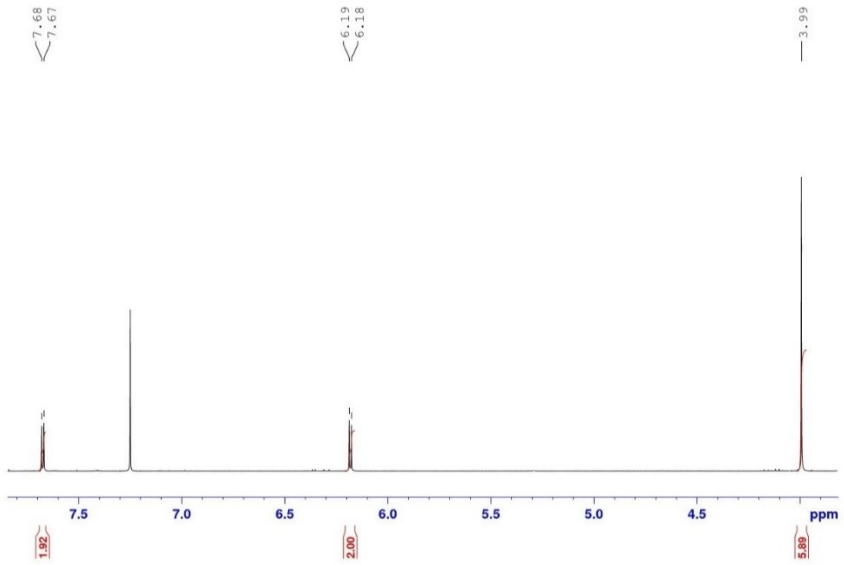
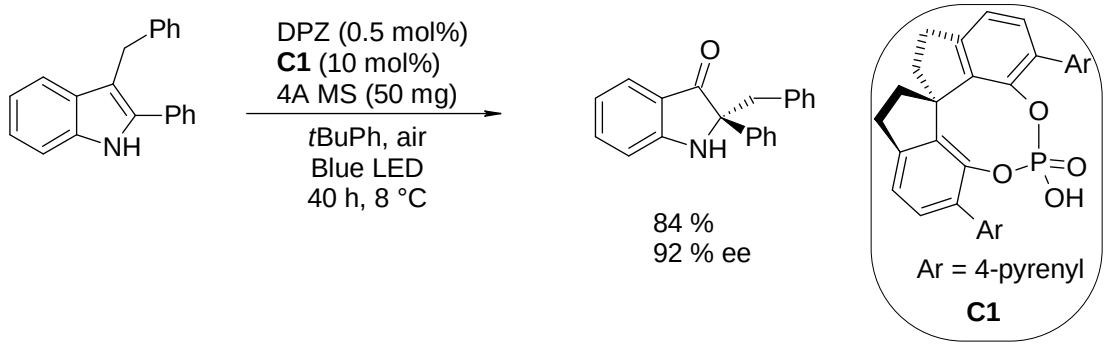


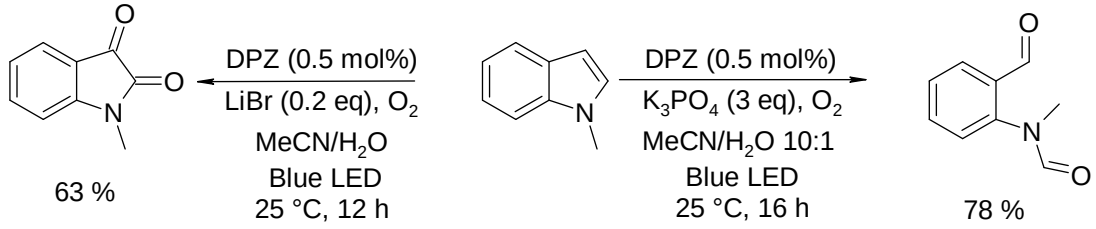
Figure 2: ^{1}H-NMR spectrum of DPZ catalyst (400 MHz, $CDCl_3$, 25 °C).

Examples of usage:

a) aerobic oxidation and semipinacol rearrangement [2]:



b) photooxygenation of indoles [3]:



c) photocatalytic aerobic dehydrogenation [4]:

Literature:

[1] Z. Hloušková, F. Bureš, *Arkivoc* **2017**, *4*, 330.
[2] Bu, L. et al. *Chem. An Asian J.* **2018**, *13*, 2382.
[3] Zhang, C. et al. *ACS Catal.* **2016**, *6*, 6853.
[4] Shao, T. et al. *Acta Chim. Sin.* **2017**, *75*, 70.
[5] Z. Hloušková, et al. *ChemistrySelect* **2018**, *3*, 4262.
[6] X. Liu, X. Ye, F. Bureš, H. Liu, Z. Jiang, *Angew. Chemie - Int. Ed.* **2015**, *54*, 11443.

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