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Light Induced Reactions Catalyzed by Porphyrinoids

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„Do as nature, work as nature, and produce as nature” (Bao-Lian Su)

Photocatalysis has recently emerged as powerful tool for the formation of C-C bonds mainly catalyzed by ruthenium and iridium complexes.[1,2] But, they are both very expensive and undesirable by pharmaceutical industry. On the other hand, organic dyes exhibit considerable advantages and in fact they have been shown to act as photoredox catalysts with eosin Y being the most widely studied.[3]

Our life depends on porphyrinoids - pigments of life. They are responsible for oxygen transport (heam), electron transport (cytochrome c), and photosynthesis (chlorophyll a). Chlorophylls are, in the first instance, responsible for transforming light energy into the chemical reactivity with the ultimate production of starch (photosynthesis). We follow nature and exploit the potential of pigments of life.



This presentation will highlight a successful application of porphyrinoids as catalysts for visible-light induced selective functionalizations. In particular, these compounds are effective in catalyzing C-C bond forming reactions involving the reductive or oxidative quenching. Employing dual catalytic system – photocatalysis merged with enamine-iminium catalysis alkylation of carbonyl compounds at the α position was accomplished.[4,5]

Porphyrins with tuned physicochemical properties, via tailoring various substituents at the periphery of the macrocycle, are also effective in catalyzing light-induced direct arylation of heteroarenes with diazonium salts [6] or deaminative alkylation [7].

REFERENCES

1. T. Darmanin, F. Guittard, *J. Am. Chem. Soc.* 2011, **133**, 15627.
2. Prier, C. K.; Rankic, D. A.; MacMillan, D. W. C. *Chem. Rev.* 2013, **113**, 5322.
3. Nicewicz, D. A.; Nguyen, T. M. *ACS Catal.* 2014, **4**, 355.
4. K. Rybicka-Jasińska, W. Shan, K. Zawada, K. M. Kadish, D. Gryko *J. Am. Chem. Soc.* 2016, **138**, 15451.
5. K. Rybicka-Jasińska, K. Orłowska, M. Karczewski, K. Zawada, D. Gryko *Eur. J. Org. Chem.* 2018, DOI: 10.1002/ejoc.201800542.
6. K. Rybicka-Jasińska, B. König, D. Gryko, *Eur. J. Org. Chem.* 2017, 2104.
7. M. Ociepa, J. Turkowska, D. Gryko *ChemRxiv* 2018, <https://doi.org/10.26434/chemrxiv.6510125.v1>.