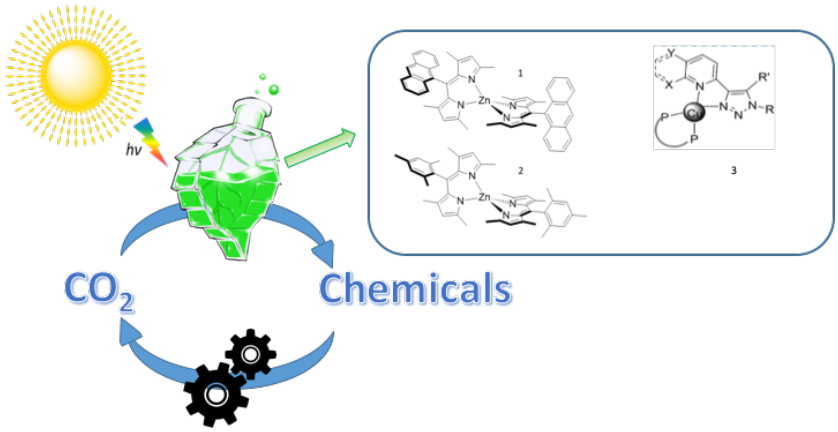
Earth-Abundant Photosensitizers and Light-Harvesting Antennae

Claudia Bizzarri

Institute of Organic Chemistry, Karlsruhe Institute of Technology,
Fritz-Haber-Weg 6, Karlsruhe, Germany
bizzarri@kit.edu

Solar energy is the only renewable and carbon-neutral energy source of sufficient scale to replace fossil fuels.[1] The direct conversion of light into chemical bond energies has the advantage over photovoltaics to be able to store large amount of energy in form of chemicals. Important milestones have been recently achieved on artificial photosynthesis,[1b-1c] nevertheless in terms of applicability, these photosensitizers should be easily available and cost-effective, thus, earth-abundant materials are highly desired. [2-3]

New bis(dipyrrinato) Zn(II) complexes[3] and new heteroleptic Cu(I) complex (mononuclear and multinuclear), obtained by modification of the diimine ligand, based on substituted 1,2,3-*1H*-triazole,[2] are presented. We explore their photophysical and electrochemical properties, revealing that these metal complexes possess an unordinary high photoluminescence quantum yield. Further strategies to lower non-radiative constants will be discussed, as the use of mesoporous silica.[4] Finally, some experiments on photoreduction of carbon dioxide are presented.[5]



[1] (a) N. Armaroli; V. Balzani; *Chem. Eur. J.,* **2016**, 22, 32-57 ; (b) S. Berardi, et al., *Chem. Soc. Rev*. **2014**, *43*, 7501-7519 ; (c) M. Heberle, et al. *Chem Eur. J.* **2017**, *23*, 312–319.
[2] C. Bizzarri, A. P. Arndt, S. Kohaut, K. Fink, M. Nieger *J. Organometallic Chemistry* **2018**, *871*, 140-149.
[3] D.Tungulin, J. Leier, A. B. Carter, A. K. Powell, R.Q. Albuquerque, A-N. Unterreiner, C. Bizzarri, *Chem.Eur. J.* **2019***, 25,* 3816.
[4] U.Sani, D. Tungulin, C.Bizzarri, F. Cucinotta, *RSC Advances* **2020***, 10,* 2841-2845.
[5] L.-L. Gracia, L. Luci, C. Bruschi, L. Sambri, P. Weis, O. Fuhr, C.Bizzarri *in revision*.