

Ultrafast Excited State Dynamics of Iridium(III) Photosensitizers

Antje Neubauer¹, Nils Rockstroh², Michael Karnahl³, Henrik Junge², Matthias Beller², Stefan Lochbrunner¹, and Stefanie Tschierlei^{1,4}

¹University of Rostock, Institute of Physics, D-18059 Rostock, Germany

²Leibniz Institute for Catalysis at the University of Rostock, D-18059 Rostock, Germany

³University of Stuttgart, Institute of Organic Chemistry, D-70569 Stuttgart, Germany

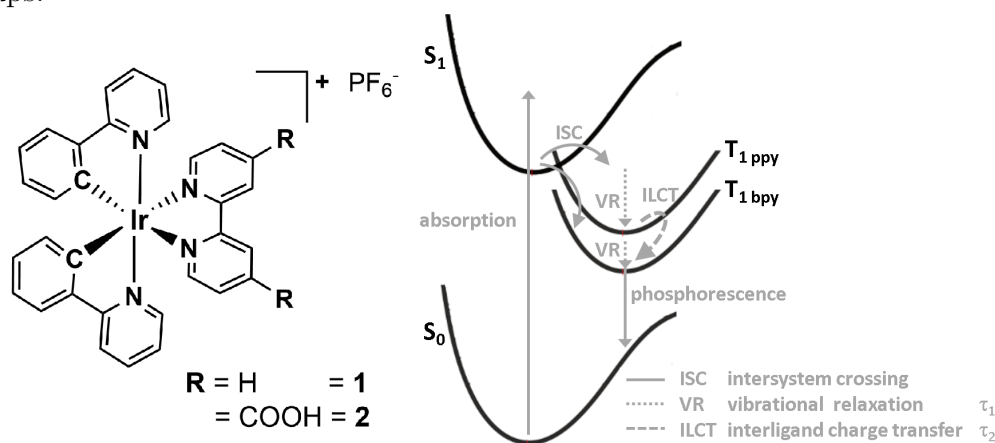
⁴Ulm University, Institute of Inorganic Chemistry I, D-89081 Ulm, Germany

E-mail: stefanie.tschierlei@uni-ulm.de

Subject of this contribution is the investigation of the photophysical properties of a series of heteroleptic iridium(III) photosensitisers bearing 2-phenyl-pyridine and different 2,2'-bipyridine (bpy) ligands (Fig. 1 left). These complexes have been already successfully applied in proton reducing systems for the photocatalytic production of hydrogen. In this report, the initial light-induced electron transfer and intramolecular relaxation steps are elucidated by means of time-resolved optical spectroscopy.

An substitution at the bpy ligand influences the absorption and emission features as well as the excited state absorption properties of the respective complexes. We could assign these processes after light excitation (Fig. 1 right) to vibrational relaxation (sub 1ps) and an interligand charge transfer (≈ 30 ps). The interligand charge transfer leads to absorption changes which depend on the polarisation of the probe light.

Surprisingly, the interligand charge transfer, from the 2-phenyl-pyridine to the bpy ligand, occurs only for the unsubstituted bpy ligand and not for the ligand substituted with carboxyl anchor groups.



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References:

- [1] F. Gärtner et al., *Angew. Chem. Int. Ed.*, **2009**, 48, 9962. [2] A. Neubauer et al., *J. Phys. Chem. Lett.*, **2014**, 5, 1355. [3] S. Fischer et al., *ChemCatChem*, **2016**, 8, 404. [4] S. Tschierlei et al., *Phys. Chem. Chem. Phys.*, **2016**, 18, 10682.