

Enhancement of light emission using organic fluorophores as antennas in unusual situations: The cases of tetrazines and 2-D hybrid perovskites



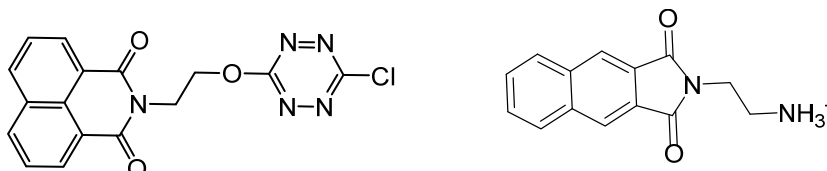
Pierre Audebert, E. Deleporte, G. Clavier

Pierre Audebert, PPSM, ENS-Cachan, 61 avenue du Pt Wilson, Cachan 94235, France, Fax: 33-1-47402454. audebert@ppsm.ens-cachan.fr

Energy transfer between two fluorophores is a process which has been known for a very long time. However, in the standard case, its interest is limited, since while the absorption of the “antenna” fluorophore captures the light at an interesting wavelength, on the other hand, the part of the spectrum corresponding to the absorption of the emitter is usually lost.

On the other hand, the phenomenon has been used for fluorophore reactivation, controlled deactivation with photochromes, and so on... A specially interesting case is when a good absorber is coupled with a good emitter, but possessing on the other hand a very weak absorption. This is the widely investigated case of lanthanide complexes, whose luminescence is based on high spin states f-f transitions extremely weakly absorbing, allowing the existence of luminophores with a very large Stokes shift.

A rarer case, almost unregarded, consists in the situation of a fluorophore, or a phosphor, having a quite low absorption on the transition responsible for its fluorescence/phosphorescence. This is the case of tetrazine fluorophores, which fluoresce on a low-absorbance n-p* transition, and perovskites, where a weakly absorbing polariton delocalized state is responsible for light emission.



Tetrazine activated by a 1,8-naphthalimide; 2,3-naphthalimide ammonium for a perovskite activation.

We have developed two specific chromophore antennas, featuring both a strong absorption, but also which are able to transfer very efficiently energy to both tetrazines¹ and selected 2-D perovskites². These are the imides presented hereabove. In the particular case of the perovskites, the challenge is not trivial, since only the energy transfer should occur, not being concurred by the electron transfer, and in addition, the crystallographic structure of the perovskite should be retained. The results will be discussed in the presentation, along with the opportunities opened by this approach.

- 1) Q. Zhou, R. Méallet-Renault, F. Miomandre, J. Tang, Z. Shaukat and P. Audebert, , *J. Phys. Chem. C* **115** (2011) 21899.
- 2) K. Jemli, P. Audebert, L. Galmiche, G. Trippe-Allard, D. Garrot, J. S. Lauret and E. Deleporte, *A.C.S interfaces and Appl. Mater.*, **7**, (2015) 21763.

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