南京大学高济宇有机化学前沿讲座

Find the Art of Chemistry!

题　　目：**Advances in P- based Molecular Materials for Opto-electronic Application**

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About Muriel Hissler

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Pr Muriel Hissler obtained her PhD degree at the University of Strasbourg (France) in 1998. Then, she joined the group of Prof. R. Eisenberg in Rochester (USA). Subsequently, she joined the group of Prof. R. Réau in Rennes (France) as Maître de Conférences. In 2006, she has obtained her Habilitation. In 2007, she was appointed full Professor at University of Rennes 1. Her research activities are mainly directed towards the synthesis of heteroatom-based pi-conjugated oligomers or polymers having physical properties useful for optoelectronic applications. The most striking results are the synthesis of the first conducting polymers and polyaromatic hydrocarbons containing phosphole rings and development of organophosphorus materials for OLEDs. Her scientific works give rise to several industrial collaborations (Rhodia, Novaled, Exxelia and Tantalium) and to 101 publications, 4 patents, 78 invited conferences. In 2005, she has obtained the French Chemical Society Award in Coordination Chemistry for Young Chemist. Since 2007, she is a junior member of the Institut Universitaire de France. She was Vice Chair and Short Term Scientific Missions coordinator within the COST SIPS Action CM1302.

Lecture abstract:

Since the pioneering work of Shirakawa, Heeger and McDiarmid in the 1970's, the interest for organic π-conjugated systems has grown tremendously. Indeed organic materials offer the possibility to process light-weight, flexible electronic devices, however, they have to satisfy a large number of technical requirements in order to be stable and efficient in the device. The insertion of a heteroelement into the backbone has appeared as an appealing way to tune the properties of the materials. Heterocycles like thiophene, pyrrole, and their derivatives are now widely used to modify chemical and physical properties of π-conjugated systems. Interestingly, while organophosphorus derivatives have been investigated for decades, their insertion into devices has only been achieved recently. The high reactivity and toxicity of many P-derivatives is one of the reason but the ability of chemists to stabilize and protect the P-atom allowed the introduction of organophosphorus derivatives into opto-electronic devices. Here, we will report on phosphorus based molecular materials: their synthesis, their unique properties useful for organic electronic materials, and the devices that they have been incorporated in so far. For example, we have shown that phosphorus heterocycles (phospholes, phosphetes, phosphepines…) are appealing building blocks for the construction of π-conjugated systems. Effectively, the reactivity of the P-center allows a straightforward HOMO-LUMO gap tuning as evidence by photophysical and electrochemical studies. The coordination ability of the P-center allows unprecedented coordination-driven assembly of π-systems onto transition metals. All these physical properties make phosphorus heterocycles valuable building blocks for the development of material for optoelectronic applications.

Selected publications:

[1] D. Joly, D.; P. A. Bouit, M. Hissler, *J. Mater. Chem. C.* **2016**, *4*, 3686.

[2] M. P. Duffy, W. Delaunay, P.A. Bouit, M. Hissler, *Chem. Soc. Rev.* **2016**, *45*, 5296.

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