

# Luminescent organometallic materials using pyridylidene ligands for optoelectronic applications

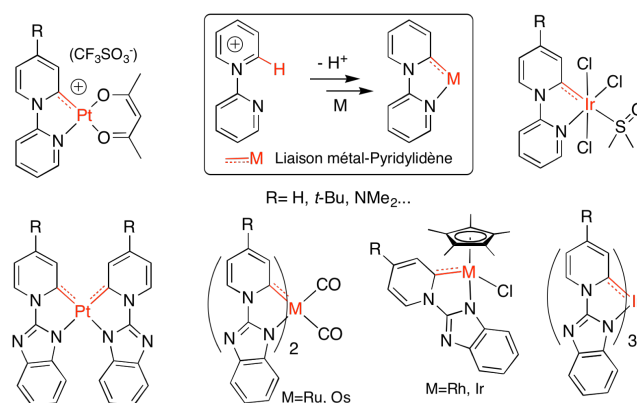
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## Abstract

Metal complexes of N-Heterocyclic carbenes (NHC) have found a plethora of applications in the last two decades following the seminal work of several groups. This contrasts with the underexplored pyridylidene category. Pyridylidenes exhibit a higher  $\sigma$ -donor and  $\pi$ -acceptor character than imidazolylidenes, thus pyridylidenes are attractive ligands to promote organic transformations or light emission in the related transition metal complexes. Pyridylidenes remain scarcely investigated certainly due the absence of general methods for accessing pyridylidene-based metal complexes. Only few specific routes were reported to date. In this context our research investigations describe the development of several methods for the synthesis of organometallic compounds containing pyridylidene ligands with transition metals such as Ru(II), Os(II), Rh(III), Ir(III) and Pt(II). In particular, some of the complexes obtained exhibit strong phosphorescence in the solid state which makes them attractive candidates as doping materials in OLEDs to harvest the triplet excitons. Some of the non-metallated compounds exhibits TADF (Thermally Activated Delayed

Fluorescence) which is of high interest in the third generation of OLED emitters. Moreover, our novel materials also show interesting NLO, catalytic and biological properties that are investigated in collaboration with several research groups. During this presentation, the development of our novel materials as well as the photophysical properties will be presented.



**Figure:** Archetypal structures of prepared compounds with pyridylidene ligands

## Recent Publications

1. J. Moussa, G. R. Freeman, J. A. Gareth Williams, L.-M. Chamoreau, P. Herson, H. Amouri, *Eur. J. Inorg. Chem.* **2016**, 76
2. A. Hassoun, A. Benchohra, O. Khaled, D. Seghouane, J. Moussa *Monatshefte fuer Chemie* **2020**, 151, 799
3. S. S. Jamil, J. Moussa, *review submitted for publication*
4. J. Montagu, G. Gontard, J. A. G. Williams, J. Moussa *Eur. J. Inorg. Chem.* **2023** e202300487
5. J. Moussa, F. Julia, L.-M. Chamoreau, P. Gonzalez-Herrero *New. J. Chem.* doi.org/10.1039/D3NJ05209E

## Biography



Dr. Moussa obtained a PhD from Université Pierre et Marie Curie (UPMC), in Paris, France in 2007 working on the synthesis of luminescent transition metal complexes. He then moved to ETHZ for a two-year postdoctoral stay in the group of Antonio Togni working on the use of ferrocenyl based NHC ligands for asymmetric catalysis. He was then appointed an assistant professor position in 2009 at UPMC. In 2023 he defended the Habilitation to direct researches as associate professor at Sorbonne Université, Paris. He is currently leading his research in a research group at Sorbonne Université involved in a strong CNRS-Kyushu University Japan with the group of Prof. C. Adachi in the frame of the IRP (International Research Project) LUX-ERIT with the aim to seek photonic applications such as OLEDs technology. Dr. Moussa has co-authored more than 50 papers and oral communications. H-index 23. Citations 1690.

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