

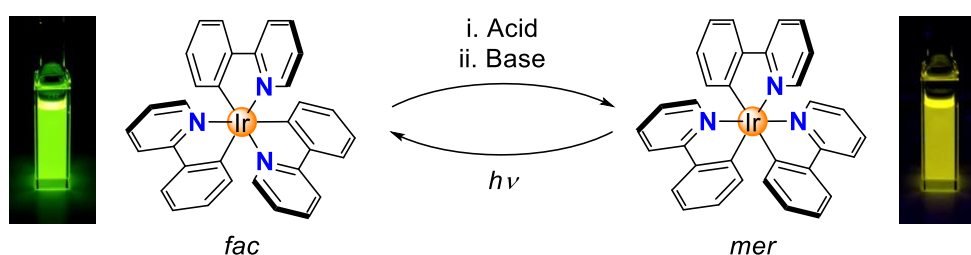
Reversible switching of luminescence of Ir(III) complexes

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Chromism is a reversible change of color induced by external stimuli (e.g. light, heat, chemical reaction). Chromic compounds provide a solid basis for smart materials that are the most commonly applied nowadays in high-technology, such as electronics, optics, thermometry, biomedicine, textile fabrication etc.¹ Recently, chromic metal complexes are of growing interest because of their diverse structures and functions. Recent achievements have been reached in the metal complexes featured by well-known photochromic switches like azobenzenes, merocyanines, diarylethenes.² However, the chromic metal complexes based on their intrinsic stimuli-induced behavior, which could open a new field of switches, are rare because of limited methodologies of designing of such compounds.

Hereby we introduce a new class of chromic molecular switches based on luminescent arylpyridyl Ir(III) complexes widely known due to their unique chemical and photophysical properties.³ Luminescence chromism of the complexes is achieved by a reversible switching between two geometric isomers (*fac* and *mer*) having distinct emission properties (Scheme 1).



Scheme 1. Switching between *fac*-Ir(ppy)₃ and *mer*-Ir(ppy)₃.

The switching procedure combines a well-studied photo-induced *mer*→*fac* isomerization⁴ and a novel acid-base-induced *fac*→*mer* isomerization developed first in our group. The chemically induced isomerization is fast, clean, quantitative, tolerant to different substituents, and stereoselective. It also opens up a new synthetic possibility to access the *mer* isomers, which are difficult to prepare otherwise.

The luminescence chromism of Ir(III) switches was found reversible for at least ten cycles. As a proof-of-concept, a luminescent display was prepared as a demonstration of possibility to use this complexes for such type of smart materials as rewritable data storage devices.

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[1] W. Chen, Y. Pan, J. Chen., *Chin. Chem. Let.*, **2018**, 29, 1429-1435.

[2] C.-C. Ko, V. Wing-Wah Yam, *J. Mater. Chem.*, **2010**, 20, 2063-2070.

[3] E. Zysman-Colman, Iridium(III) in Optoelectronic and Photonics Application, *John Wiley & Sons*, Chichester, West Sussex, **2017**.

[4] A. McDonald, M. Lutz, L. von Chrzanowski, *Inorg. Chem.*, **2008**, 47, 6681-6691.