Exceptionally Stable Red Light Emitting Electrochemical Cells Based on Cyclometallated Iridium(III) Complexes

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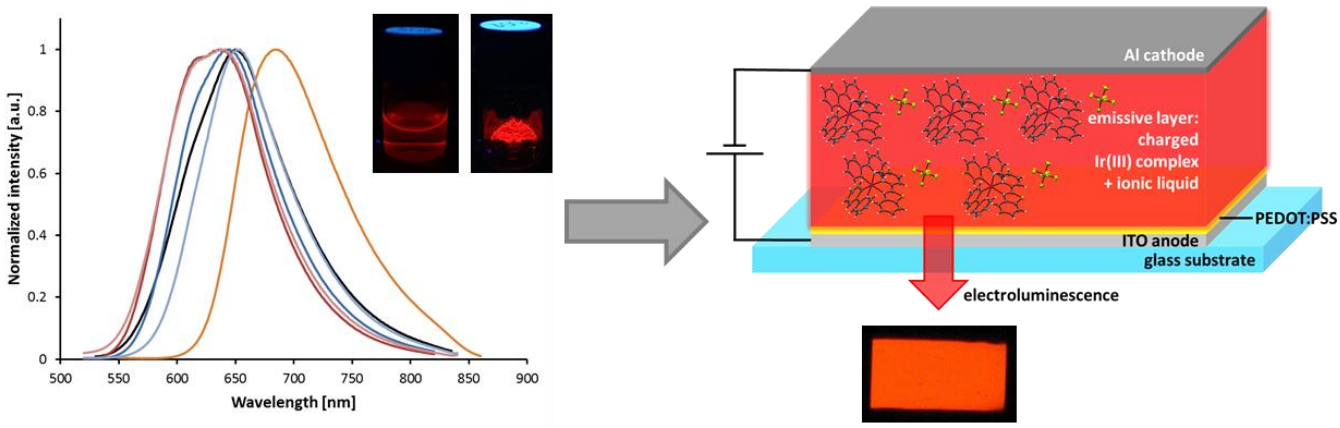
Cationic iridium(III) complexes of the type $[Ir(C^N)_2(N^N)]^+$ are the most intensely studied emissive compounds for light emitting electrochemical cells (LEECs). In addition to their good photophysical and chemical properties and ionic nature, emission colour tuning is straightforward due to spatial separation of the frontier orbitals, making these complexes well suited for LEEC applications.[1]

Nonetheless, there is still a lack of stable and efficient red emitters, crucial also for the production of white LEECs. By the introduction of a benzothiazole unit it was possible to effectively red-shift the emission maximum by 50 nm when compared to the archetypal complex $[Ir(ppy)_2(bpy)][PF_6]$.



Based on these findings, a series of related iridium complexes with different cyclometallating and ancillary ligands was investigated. All complexes are orange to deep red emitters, both in solution and in the solid state. For selected complexes in this series, highly stable LEECs were prepared, resulting in the longest reported lifetimes for red emitting iridium(III) complexes.

[1] R. D. Costa, E. Ortí, H. J. Bolink, F. Monti, G. Accorsi, N. Armaroli, *Angew. Chem. Int. Ed.*, **2012**, *51*, 8178–8211.