Design Rules for Emissive and Electrochemically Stable Silver(I) Complexes for Light-Emitting Electrochemical Cells

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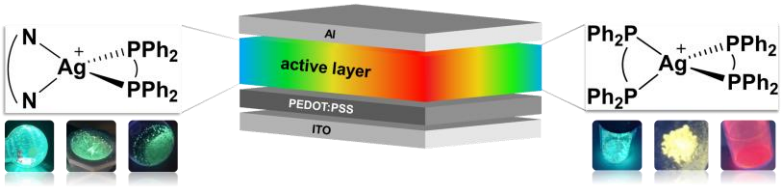
Light-emitting electrochemical cells (LECs) are the simplest and cheapest lighting devices as they combine air-stable electrodes, low-cost and up-scalable solution-based fabrication techniques.[1] Among others, d^{10} ionic transition metal complexes (iTMCs) play a key role as electroluminescent emitters toward sustainable LECs. In this context, four-coordinated Cu(I)-iTMCs have been widely studied over the last decades,[2] while much less attention has been devoted to Ag(I)-iTMCs. So far, the main issues of Ag(I)-iTMCs are *i)* their poor electrochemical stability, *ii)* the controversially discussed emission mechanisms, and *iii)* the lack of high- and low-energy emitting Ag(I)-iTMCs.[3] Over the last three years, we have established structure property relationships for homoleptic ($[Ag(P\hat{}P)]_2^+$) and heteroleptic ($[Ag(N\hat{}N)(P\hat{}P)]^+$) Ag(I)-iTMCs for both, photo- and electroluminescent (LECs) behavior. Rainbow emitting homoleptic Ag(I)-iTMCs were accessed *via* subtle modification of the diphosphine backbone (λ_{em} = 450-700 nm; photoluminescence quantum yields (ϕ) up to 45%) and were found to show superior electrochemical stability and thermally activated delayed fluorescence which is rarely observed in heteroleptic Ag(I)-iTMCs.[4] Concerning the latter, the substitution pattern (mono-/disubstituted, electron-donating/-accepting groups) of the N^N ligands turned out to be extremely sensitive toward changes in the nature and lifetimes of the excited states, ϕ and electroluminescent properties.[5]



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