Luminescent platinum systems based on the chromophore 2-phenylbenzothiazole

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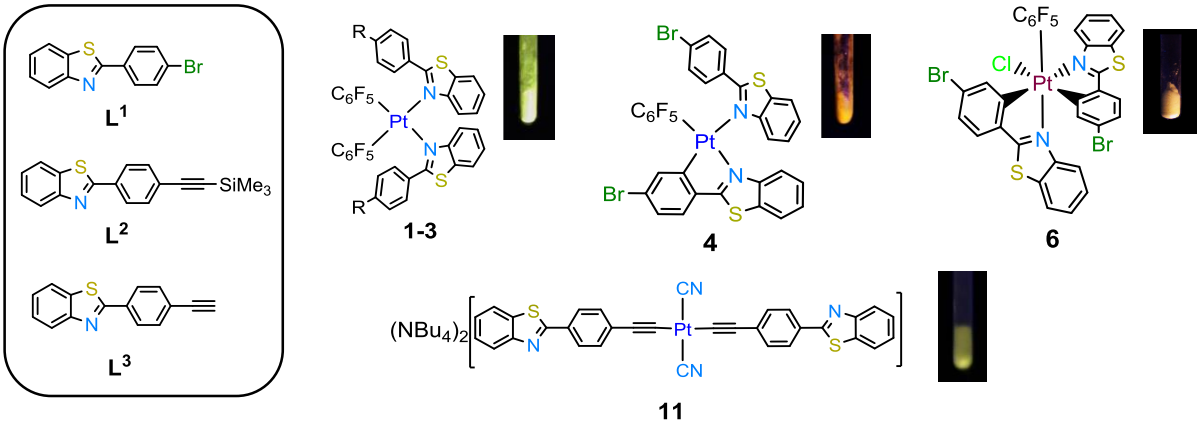
In the last years, luminescent platinum complexes have been widely studied for their rich photochemistry and wide applicability in optical technologies.[1] Thus, they have been employed as dopants in electroluminescent materials, chemosensors, photocatalysts, probes for bioimaging, photosensitizers for dye-sensitized solar cells and singlet-oxygen generation and photodynamic chemotherapy. In this regard, a good number of studies concentrate on *trans*-(alkynyl)bis(phosphine)Pt(II) chromophores and Pt(II) systems with cyclometalated or polypyridyl ligands, while related works on Pt(IV) derivatives are scarce.

In this work, we have used three ligands based on the chromophore 2-phenylbenzothiazole (Scheme 1. Br-bt **L^1**, $Me_3SiC{\equiv}C$-bt **L^2**, $HC{\equiv}C$-bt **L^3**), which present a great versatility of coordination, via nitrogen (*κN*) or cyclometalated (*κC^N*) and in the case of **L^3**, coordination as an alkynyl ligand ($C{\equiv}C\text{-bt}^-$) upon deprotonation. Thus, we have prepared the series of Pt(II) derivatives *cis*-[Pt(L-*κN*)$_2$(C_6F_5)$_2$] (L= L^1 **1**, L^2 **2**, L^3 **3**) containing the ligands coordinated through the nitrogen atom. Activation of **1** produces the metalation of the pendant coordinated N^CH ligand to give the cyclometalated Pt(II) derivative [Pt(L^1-*κC,N*)(L^1-*κN*)(C_6F_5)] **4**, which can be oxidized to the bis(cyclometalated) Pt(IV) species [Pt(L^1-*κC,N*)$_2$(C_6F_5)Cl] **6**. Adequate substitution reactions afford cyanide Pt(II) and Pt(IV) derivatives (**5** and **7**), which allow modify the electronic characteristics, tuning the photophysical properties. Finally, by using the ligand L^3, we have synthesized a series of *trans*-platinum(bis-alkynyl) derivatives *trans*-[Pt($C{\equiv}C$-bt)$_2$L$_2$]^n (n = 0, L = PPh_3 **8**, PEt_3 **9**, PTA **10**, n = 2-, L = CN^- **11**). Detailed structural and photophysical studies on these Pt(II) and Pt(IV) derivatives have been carried out.

[1] V. W. W. Yam, V. K. M. Au, S. Y. L. Leung, Chemical Reviews, **115** (2015) 7589



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