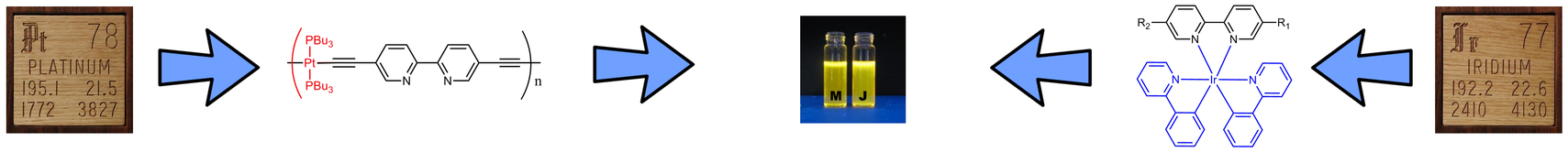
UNIVERSITÉ DE SHERBROOKE

Discovering New Heterometallic Pt, Ir complexes and Their Application In OLEDs



Ahmed Moez Soliman, Pierre.D.Harvey*, Eli Zysman-Colman*, *Département de Chimie, Université de Sherbrooke*
2500, Boul. de l'Université, Sherbrooke, QC, Canada J1K 2R1, Ahmed.m.Soliman@Usherbrooke.ca

Introduction:

OLEDs are light-emitting diodes (LED) in which the emissive electroluminescent layer is a film of organic or organometallic compounds. The manufacturing process of OLEDs lends itself to several advantages over flat-panel displays made with LCD technology: notably it is cheaper and is more energy efficient, has lower working voltage and has greater color range.

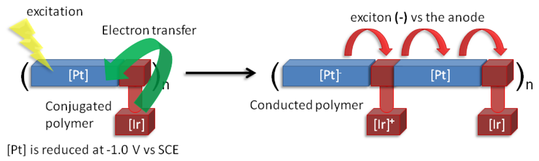
They are used in television screens, computer monitors, portable system screens such as mobile phones, PDAs and watches.

Project objective:

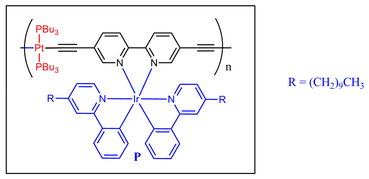
The goal of this work is to prepare new conjugated and unconjugated hybrid polymers containing Ir and Pt units (**P**). These units are known to be each oxidizable and reducible at reasonably low potentials, making them good electron acceptors and donors, respectively. Scheme **1** shows the proposed photoinduced electron transfer and exciton migration that should be obtained in such hybrid polymers.

The polymers are designed to obtain high performance luminophores for **WPOLED** (**W**hite **P**olymer **O**rganic **L**ight **E**mitting **D**iode) applications.

Scheme 1

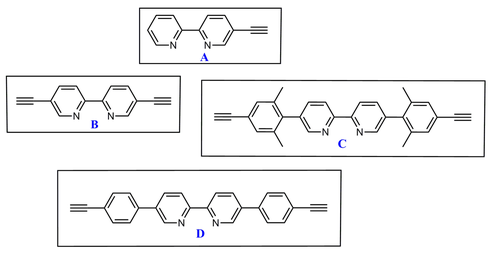


Target Ir-Pt polymer:

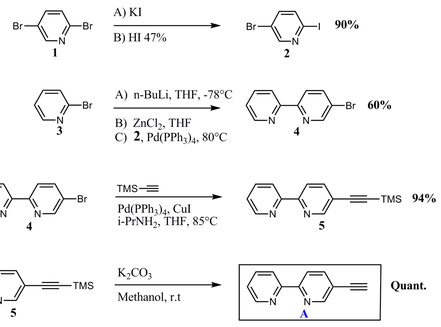


R = $(CH_2)_9CH_3$

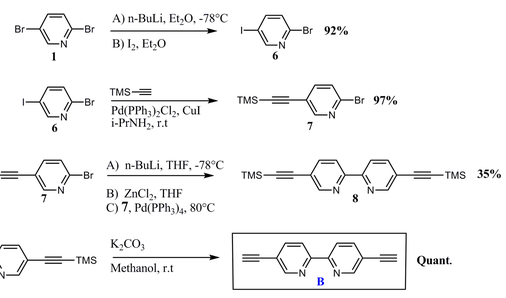
Model bipyridines :



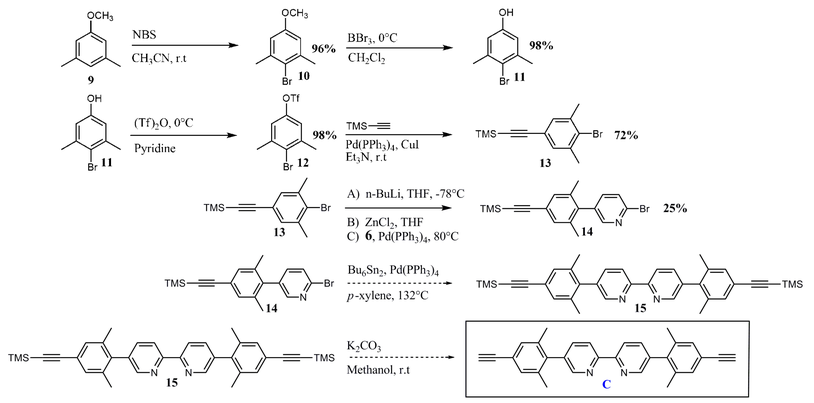
Ligand (A):



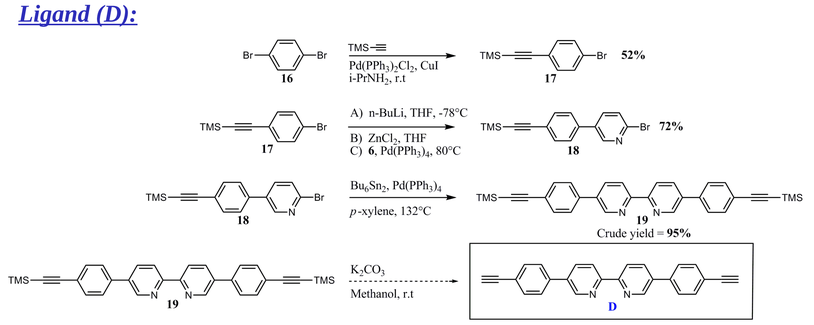
Ligand (B):



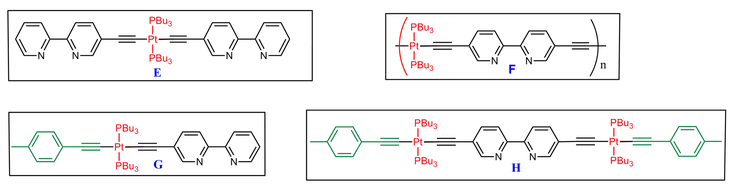
Ligand (C):



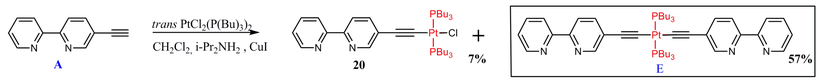
Ligand (D):



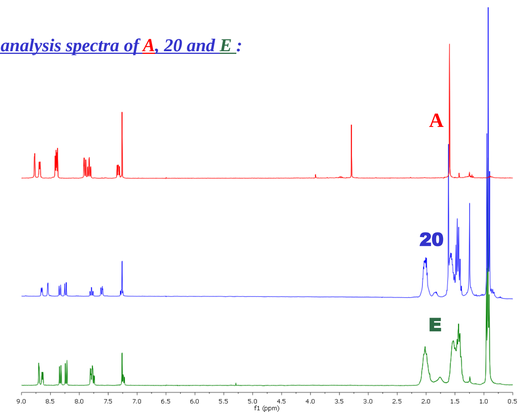
Model Pt-containing complexes:



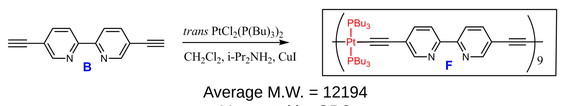
Pt-complex (E):



[1]HNMR analysis spectra of A, 20 and E :

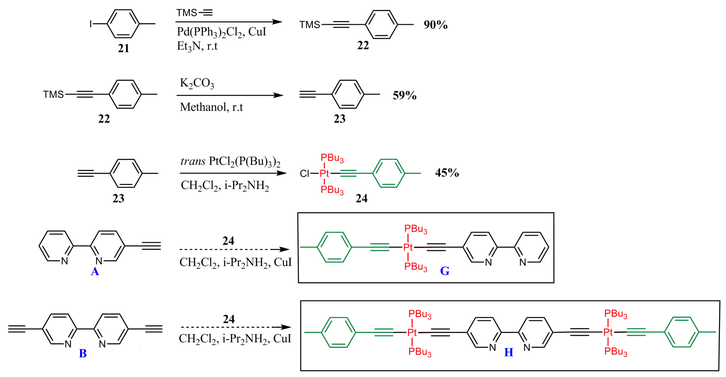


Pt-polymer (F):

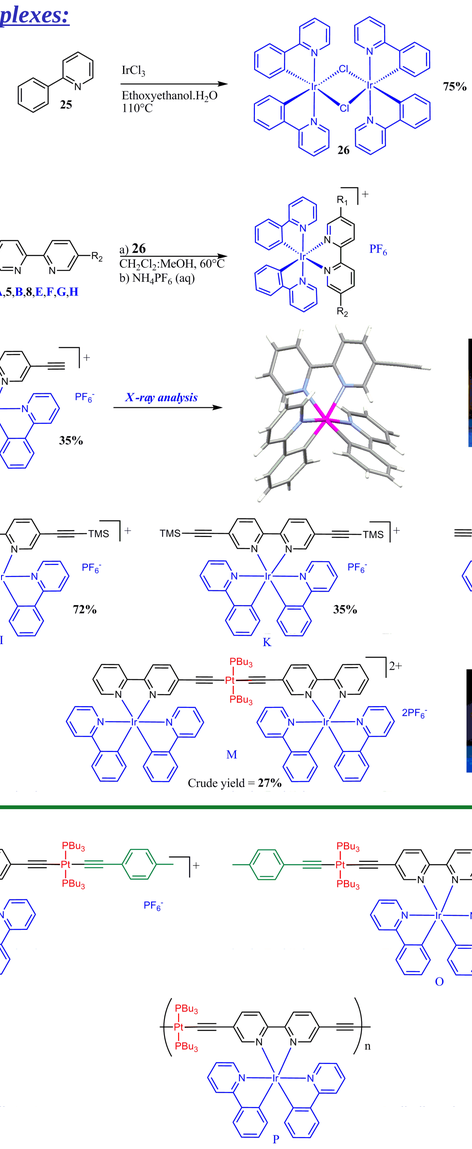


Average M.W. = 12194
Measured by GPC

Pt-complexes (G) & (H):



Ir-Pt complexes:



Conclusion:

As a first step towards polymer construction, we report the synthesis of a series of homometallic and heterometallic monomeric units. 5 and 5,5' ethynyl-2,2'-bipyridine derivatized units were synthesized using Negishi and Stille coupling reactions. They were then coupled with *trans*-Pt$(PBu_3)_2Cl_2$ to afford *trans* Pt-acetylide containing complexes. Finally, these molecules were coupled with a dimeric iridium source to yield heterometallic complexes. Full photophysical characterization is forthcoming.

Acknowledgements:

Pr. Zysman-Colman's laboratory team
Pr. Harvey's laboratory team
Daniel Fortin

Support:

UNIVERSITÉ DE SHERBROOKE
RÉSEAU QUÉBÉCOIS DE CALCUL DE HAUTE PERFORMANCE
Fonds de recherche sur la nature et les technologies Québec
Canada Foundation for Innovation
Fondation canadienne pour l'innovation
cqmf centre québécois sur les matériaux fonctionnels
NSERC CRSNG
CÉMOPUS
Centre d'Études des Matériaux Optiques et Photoniques de l'Université de Sherbrooke