

SYNTHESIS AND PHOTOPHYSICAL PROPERTIES OF PHOSPHINE ACETYLIDE AMIDINATE STABILIZED COPPER(I) AND GOLD(I) HETEROBIMETALLIC COMPLEXES

Shubham, Vanitha R. Naina, and Peter W. Roesky

Institute of Inorganic Chemistry, Karlsruhe Institute of Technology, Karlsruhe, Germany

Here, we present an unprecedented synthesis of phosphine acetylide amidinate stabilized copper(I) and gold(I) heterobimetallic complexes. The synthesis starts with the preparation of ligand [$\text{Ph}_2\text{PC}\equiv\text{CC}(\text{NDipp})_2$] $\text{Li}(\text{thf})_2$ (**1**) by the reaction of $\text{Ph}_2\text{PC}\equiv\text{CLi}$ and Dipp carbodiimide. Subsequently, salt metathesis reactions with CuCl and $\text{Au}(\text{tht})\text{Cl}$ was carried out, leading to the formation of [$\text{Ph}_2\text{PC}\equiv\text{CC}(\text{NDipp})_2$] $_2\text{Cu}_2$ (**2**) and [$\text{Ph}_2\text{PC}\equiv\text{CC}(\text{NDipp})_2$] $_2\text{Au}_2$ (**3**), respectively [1]. These two complexes exhibit distinct molecular structures due to different coordination sites of ligand. Exploiting the efficiency of compound **2** as a metalloligand, we further synthesized Cu(I) and Au(I) containing heterobimetallic complexes by harvesting the coordination potential of the phosphine. This led to the formation of complexes of the type [$(\text{AuX})\text{Ph}_2\text{PC}\equiv\text{CC}(\text{NDipp})_2$] $_2\text{Cu}_2$ ($\text{X} = \text{Cl}$ (**4**), Br (**5**), I (**6**) and Mes (**7**)) by reacting **3** with 2 eq. of CuX ($\text{X} = \text{Cl}$, Br , I , and Mes). Interestingly, these complexes, **4-7**, could also be obtained through a convenient one-pot reaction involving **1**, $\text{Au}(\text{tht})\text{Cl}$, and CuX in high yield as compared to above stepwise procedure. Compounds **2** and **4-7** are yellow coloured and they exhibit bright yellow coloured luminescence both in solid state and in solution under UV light. They show phosphorescence emission with a maximum between 500-620 nm in solid state and between 530-650 nm in DCM solution.

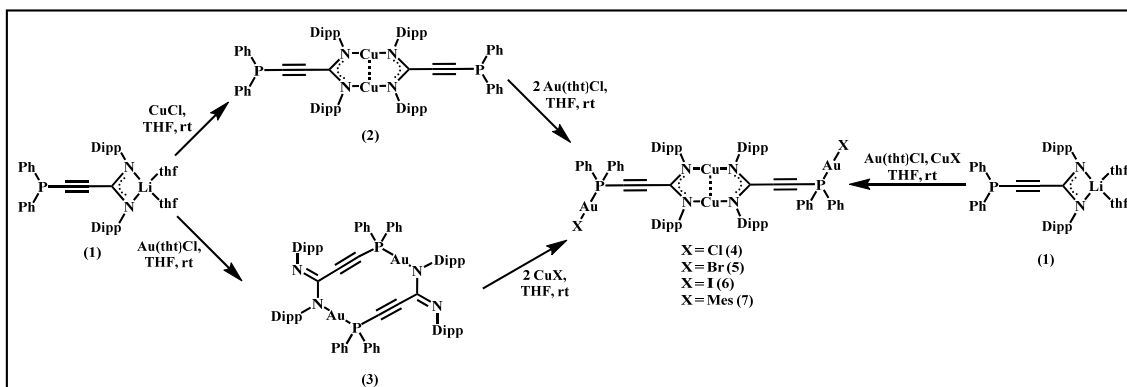


Figure 1: Synthesis schemes of Cu(I) and Au(I) heterobimetallic compounds

[1] Feuerstein, T. J.; Seifert, T. P.; Jung, A. P.; Müller, R.; Lebedkin, S.; Kappes, M. M.; Roesky, P. W. Efficient Blue Phosphorescence in Gold(I)-Acetylide Functionalized Coinage Metal Bis(amidinate) Complexes *Chem. Eur. J.* **2020**, *26*, 16676–16682.