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Genuine Au(0) Complexes: Dream or Reality?

Keywords: *gold, ligand design, bonding, radical reactivity*

Context: Despite major progress over the past 2-3 decades, the chemistry of gold lags well behind that of the other transition metals. The unique properties of gold are now well-recognized and exploited in catalysis, material sciences as well as biology. Nonetheless, the chemical space of gold remains very limited. Only Au(I) and Au(III) complexes are known essentially. Other oxidation states remain curiosities or are simply unknown. This is particularly true for Au(0) complexes which are however extremely attractive as molecular models for gold clusters and intermediates *en route* to nano-sized gold species. But so far, the quest for stable Au(0) species has resulted in only 3 relevant complexes.¹ They all involve strongly π - or σ -accepting ligands that withdraw electron density from gold (the spin density at the metal is 24% at best) and alleviate the Au(0) character.

Objectives and research plan: In a new long-term project funded by an ERC grant, it is our aim to expand further the chemical space of gold, in terms of structure, reactivity as well as applications. In this PhD/post-doc project, it is the aim to prepare and study true Au(0) complexes. We'll take advantage of our expertise in ligand design and gold chemistry under ligand control²⁻⁴ to access and stabilize Au(0) complexes retaining high spin density at gold. Chelating ligands will be employed to prevent dissociation and provide steric shielding. The Au(0) species will be prepared by electrochemical and/or chemical reduction. Their structure will be thoroughly analyzed by experimental and computational means. Their reactivity will be explored, with special interest for radical-reactivity at gold, a very uncommon behaviour.

PhD thesis/post-doc funding provided by  **erc** (Gold-Redox).

To apply, send a CV, a motivation letter and the name/contact of at least 2 reference persons.

Selected relevant references (with hyperlinks)

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