

<b>Title</b>	Gold chemistry: catalytic, supramolecular, superatomic
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<b>Research Group</b>	Applied Organometallic Chemistry (AOC)
<b>Curriculum</b>	Chemical Sciences
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**Project description:**

The AOC group has an ongoing interest in the coordination and organometallic chemistry of gold, with applications in catalysis, photophysics and medicine. In recent times, research has focused in particular on the following topics:

- Use of gold(I)/ionic liquid systems as catalyst for the hydrofunctionalization of unsaturated organic molecules;
- Development of dual/cooperative systems involving aurophilic interactions, gold-ligand interactions or the interplay between gold centers and pendant ligand functionalities;
- Organometallic molecular gold nanoclusters: tailored preparation, characterization and advanced applications.

The PhD student will practice the preparation of the target compounds (functional ligands, organometallic complexes, molecular nanoclusters), their characterization by combined techniques (optical, vibrational, magnetic and mass spectroscopies, diffraction techniques, thermal analyses, electron microscopy) and testing of their properties as catalysts in reaction of technological interest, aimed in particular at the valorization of biomass waste, or as metallodrug candidates. Testings will be conducted in-house or in collaboration with external laboratories.

**Publications:**

M. Bevilacqua, M. Roverso, S. Bogialli, C. Graiff, A. Biffis, "From Au<sub>11</sub> to Au<sub>13</sub>: Tailored Synthesis of Superatomic Di-NHC/PPh<sub>3</sub> -Stabilized Molecular Gold Nanoclusters", *Inorg. Chem.* **2023**, *62*, 1383–1393.

S. Bonfante, P. Bax, M. Baron, A. Biffis, "Gold(I)-Catalyzed Direct Alkyne Hydroarylation in Ionic Liquids: Mechanistic Insights", *Catalysts* **2023**, *13*, 822.

G. Trevisan, V. Vitali, C. Tubaro, C. Graiff, A. Marchenko, G. Koidan, A. Hurieva, A. Kostyuk, M. Maurceri, F. Rizzolio, G. Accorsi, A. Biffis, "Dinuclear gold(I) complexes with N-phosphanil, N-heterocyclic carbene ligands: synthetic strategies, luminescence properties and anticancer activity", *Dalton Trans.* **2021**, *50*, 13554-13560.

**Collaborations/Network:**

Unipd Dept. Pharmaceutical Sciences (Prof. Valentina Gandin) – pharmaceutical testings

Ca' Foscari University Venice (Prof. Flavio Rizzolio) – bioactivity testings

Academy of Sciences of Ukraine (Prof. Aleksandr Kostyuk) – Ligand synthesis

University of Toulouse (Prof. Didier Bourissou) – Comparative catalyst testing

**Research funding:**

DOR, P-DiSC 2023 "GOLDBULLET", commercial contracts.