

Title	Transition metal catalysis in unconventional media
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Research Group	Applied Organometallic Chemistry – DiSC
Curriculum	Scienze Chimiche
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Project description:

The group of Prof. Biffis has an ongoing interest in the development and application of catalytic systems based on late transition metals and able to operate in peculiar media/microenvironments leading to catalytic reactions with improved performance. Currently ongoing research of this topic includes:

- Use of ionic liquids as solvents in gold(I)-catalyzed alkyne hydrofunctionalization reactions;
- Solventless reactions: photocatalysts for the curing of silicone rubber formulations;
- Hierarchical assemblies of metal/metal oxide/crosslinked polymer nanoparticles for aerobic oxidations in water and under gas-solid conditions.

The PhD student will practice catalyst preparation (organometallic complexes of late transition metals, inorganic/hybrid assemblies containing noble metal nanoclusters), characterization by combined techniques (optical, vibrational, magnetic and mass spectroscopies, diffraction techniques, thermal analyses, electron microscopy) and catalyst testing under different conditions with in situ and ex situ reaction monitoring. Both model reactions and reactions of immediate technological relevance will be considered.

Publications:

D. Franco, A. Marchenko, G. Koidan, A. N. Hurieva, A. Kostyuk, A. Biffis, Palladium(II) Complexes with N-Phosphanil-N-heterocyclic Carbenes as Catalysts for Intermolecular Alkyne Hydroaminations, *ACS Omega* **2018**, *12*, 17888-17894.

A. Biffis, P. Centomo, A. Del Zotto, M. Zecca, Pd Metal Catalysts for Cross-Couplings and Related Reactions in the 21st Century: A Critical Review, *Chem. Rev.* **2018**, *118*, 2249-2295.

M. Baron, E. Battistel, C. Tubaro, A. Biffis, L. Armelao, M. Rancan, C. Graiff, Single-Step Synthesis of Dinuclear Neutral Gold(I) Complexes with Bridging Di(N-heterocyclic carbene) Ligands and Their Catalytic Performance in Cross Coupling Reactions and Alkyne Hydroamination, *Organometallics* **2018**, *37*, 4213-4223.

Collaborations/Network:

ICMATE-CNR (Dr. Marzio Rancan, Dr. Marta Maria Natile) – XPS, XRD characterizations

ISTM-CNR (Dr. Claudio Evangelisti) – TEM microscopy

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

University of Muenster (Prof. F. Ekkehardt Hahn) – Ligand synthesis

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