Title	**Transition metal catalysis in unconventional media**
PI	BIFFIS Andrea (PI)
Research Group	Applied Organometallic Chemistry (AOC)
Curriculum	Chemical Sciences
Location	DiSC
Contact	**web:** www.organometallics.it
	email: andrea.biffis@unipd.it

Project description:

The AOC group 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 and cross coupling reactions.

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:

M. Baron, A. Biffis, "Gold(I) complexes in ionic liquids: an efficient catalytic system for the C-H functionalization of arenes and heteroarenes under mild conditions", *Eur. J. Org. Chem.* **2019**, 3687-3693

M. Moro, P. Zardi, M. Rossi, A. Biffis, "Evaluation of Heteroleptic Pt (II) β-Diketonate Complexes as Precatalysts for the Photoactivated Curing of Silicone Resins", *Catalysts* **2022**, *12*, 307.

R. Vescovo, M. Becker, M. M. Natile, P. Canton, C. Evangelisti, A. Biffis, "Microgels as Soluble Scaffolds for the Production of Noble Metal Nanoparticles Supported on Nanostructured Metal Oxides", *ACS Applied Nanomater* **2021**, 4, 8343-8351

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 Tolouse (Prof. Didier Bourissou) – Comparative catalyst testing

Research funding:

DOR, UNI-IMPRESA project 2018 "PHOTOSIL", other commercial contracts.