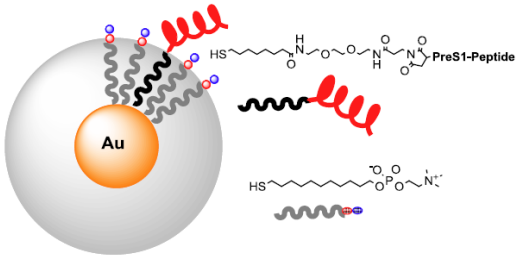
Title	**Cooperative nanosystems: from catalysis to nanomedicine**
PI	SCRIMIN Paolo
Research Group	Supramolecular Chemistry and Systems Chemistry – DiSC
Curriculum	Scienze Chimiche
Contact	**web:** www.chimica.unipd.it/paolo.scrimin
	email: paolo.scrimin@unipd.it

Project description:



Whenever a chemist deals with collection of molecules she/he faces the problem: will they cooperate? Will cooperativity improve their properties or, even more, will it elicit new ones, totally unexpected? In biological systems cooperativity is a rule rather than the exception. Cooperativity governs cell-cell, protein-protein, protein-cell interactions, critical processes for the occurrence of life as we know it. In our group we are on the search of such cooperativity by using nanosystems by taking advantage of one important property they present: multivalency. Multivalency is the presence of several (not necessarily identical) functionality on a systems and our nanosystems are all multivalent. Starting from this basic concept we are currently developing: a) efficient catalysts for the cleavage of phosphate diesters (including those of RNA and DNA); b) fully synthetic nanovaccines against meningitides; c) nanodrugs for tumor targeting. The student will operate within one of these research lines and will follow the project from its design to its actual application. Accordingly, she/will acquire expertise in molecules and nanosystems preparation and characterization and will interact with research teams of other disciplines and from different countries. The laboratory will also provide a multicultural, stimulating environment for the presence of students and post-doc from different countries.

Publications:

1. Binding and Uptake into Human Hepatocellular Carcinoma Cells of Peptide-Functionalized Gold Nanoparticles. *Bioconjugate Chem*. **2017**, *28*, 222−229. (Research line c).
2. Hydrolytic Metallo-Nanozymes: From Micelles and Vesicles to Gold Nanoparticles. *Molecules* **2016**, *21*, 1014-1032. (Research line a).
3. Efficient Phosphodiester Cleaving Nanozymes Resulting from Multivalency and Local Medium Polarity Control. *J. Am. Chem. Soc.* **2014**, *136*, 1158-1161. (Research line a).
4. Factors affecting T cell responses induced by fully synthetic glyco-gold-nanoparticles. *Nanoscale*, **2013**, *5*, 392-402. (Research line b).

Collaborations/Network:

a) European Marie Curie Network – MMBio- Molecular Tools for Nucleic Acid Manipulation for Biological Intervention. Partners from UK, Germany, Sweden, Switzerland, Belgium and Finland.
b) Progetto di Rilevanza Nazionale (PRIN): Nanoplatforms for enhanced immune responses. Partners from the Universities of Florence, Siena, Rome, Milan, Novara, Naples and Italian Institute of Technology.
c) Strategic project of the University of Padova. Partners from the Departments of Medicine and Pharmacy.

Research funding:

a) MMBio network: 250.000 €; b) PRIN: 70.000 €; c) Strategic project: 100.000 €;