Title	**Targeted nanoprobes for imaging and dual mode therapy**
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Project description:

The combination of various therapeutic strategies to treat cancer is an important and promising strategy to improve therapeutic efficiency and overcome drug resistance. Gold nanoparticles represent an ideal platform on which integrating different therapeutic and diagnostic functions as well as target molecules. The objective of this PhD project will be the engineering of biocompatible plasmonic nanostructures functionalized with photosensitizing and targeting units to be used as biosensors in cancer theragnostics. The diagnostic moiety will be constituted by SERRS nanostructures which show a high efficiency in multiplexing measurements and a detection limit approaching the single molecule level. For therapy the photothermal properties of gold nanoparticles, irradiated with light of the correct wavelength to induce localized temperature increases, will be combined with a photosensitizing agent able to generate ROS under the laser condition used for detection. The nanostructure should be biocompatible to allow long circulation times in vivo and functionalized with targeting agents for selective delivery to tumor site. Throughout this interdisciplinary project the PhD student will be involved in synthetic aspects related to the coating of the nanoparticles, in the preparation and photophysical characterization of the nanostructures and in testing the SERRS and photodynamic properties of the nanoprobes.

Publications:

1) Moret, M. Gobbo, E. Reddi (2015) Conjugation of photosensitisers to antimicrobial peptides increases the efficiency of photodynamic therapy in cancer cells. *Photochem. Photobiol. Sci. 14,* 1238-1250.

2) R. Dosselli, R. Ruiz-González,. F. Moret,. V. Agnolon,. C. Compagnin, M. Mognato, V. Sella, M. Agut,. S. Nonell,. M. Gobbo, E. Reddi (2014*)* Synthesis, Spectroscopic, and Photophysical Characterization and Photosensitizing Activity toward Prokaryotic and Eukaryotic Cells of Porphyrin-Magainin and -Buforin Conjugates. *J. Medicinal Chem*., 57, 1403-1415.

3) G. Sciutto, L. Litti, C. Lofrumento, S. Prati, M. Ricci, M. Gobbo, A. Roda, E. Castellucci, M. Meneghetti, R. Mazzeo (2013) Alternative SERRS probes for the immunochemical localization of ovalbumin in paintings: an advanced mapping detection approach. *Analyst*, 138, 4532-4541.

Collaborations/Network:

The projet is in collaboration with the Department of Surgery Oncology and Gastroenterology, University of Padova (Prof. S. Mocellin) and the Department of Medicin University of Padova (Prof. P. Pontisso).

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