

Title: MULTIFUNCTIONAL NANOMATERIALS BASED ON COLLOIDAL NANOPARTICLES FOR THERANOSTIC APPLICATIONS

Abstract.

In the last years the extraordinary advances in the field of material science and, in particular, in nanomaterial synthesis have resulted in a great potential for biomedical applications.

A variety of preparative and post-preparative colloidal routes have demonstrated able to obtain a wide choice of inorganic nanoparticles (NPs) and nanocrystals (NCs), with different compositions, that can be achieved with a high control on size, shape and surface chemistry, ultimately tailoring their electronic, optical, magnetic, thermal and chemical size dependent properties. Functionalization strategies allowing to surface engineer NPs and NCs and to tune their specific chemical reactivity towards the surrounding environment, have enabled their conjugation and combination with biologically relevant entities, thus producing advanced materials for diagnostics and therapy.

Here the design and fabrication of specialized nanomaterials ingeniously combining suitably functionalized NPs and NCs, such as semiconductors, plasmonic and magnetic nanostructures, with peptides, drugs and other relevant biological systems will be presented and their potential for diagnosis and treatment of different diseases, including cancer and neurodegenerative diseases will be illustrated. In particular, examples of drug delivery, labelling and theranostics multifunctional systems, based on NIR photoactive nanomaterials, plasmonic nanostructures and magnetic NPs will be reported.

N. Depalo, M. Corricelli, M. L. Curri ACS Applied Materials and Interfaces, 9 (49), 43113–43126.

G. Valente, N. Depalo, M. L. Curri et al. 2016 Nano Research, 9, 644-662.

N. Depalo, N. Denora, M. L. Curri et al. 2017 Nano Research 10, 2431–2448.

E. Fanizza, N. Depalo, M. L. Curri et al. 2016 Nanoscale, 6, 3350-3361.