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Surfaces: the dominant player in multifunctional hybrid architectures based on nanomaterials:

One of the most important challenges of the last years is represented by the synthesis of (bio)organic/inorganic hybrid structures with properties opportunely designed and changed by manipulating the organization of single components contributing to the realization of novel multifunctional and composite nanostructures that reflecting the synergy among the components, have the potential to overcome the functionality of traditional materials and to address specific applications. In this perspective, “bottom-up” approaches, taking advantages of different driving forces involved in the assembling process, such as electrostatic interaction, covalent bonding, coordination and supramolecular interactions, allow to arrange NPs and to manipulate the inter-particle distance.

This presentation will report different strategies in the design and fabrication of specialized systems involving properly functionalized nanoparticles and nanostructures with highly controlled physical and chemical properties and a careful surface engineering.

Nanocrystals based hybrid materials addressable to target application

This presentation will report the most recent results obtained in my laboratories in the design, the preparation and the extensive characterization of hierarchically organized systems starting from both inorganic and bio-organic building blocks to obtain more and more complex functional materials .

In particular will be examined

- ✓ new multifunctional and multi-targeting nanomaterials for labelling and theranostic applications, making use of the high functional versatility of NP surface chemistry to achieve multiple conjugations with both molecular targets and therapeutic agents.
- ✓ hybrid systems of photochemical interest to develop a new generation of complex materials in which, trough the control of composition, dimension, functionalization, modalities of and grade of structural organization of the

single nonentities, it is possible to modulate the catalytic, optic, electronic and mechanic properties