BIOFUNCTIONALIZATION OF POLYMER COATED INORGANIC NANOPARTICLES: FROM THE SURFACE ENGINEERING TO THE BIOLOGICAL APPLICATIONS

QUARTA Alessandra, PELLEGRINO Teresa & CURCIO Alberto

Istituto Nanoscienze - CNR, Lecce, Italy, EU

Abstract

In the last years inorganic nanoparticles, either magnetic or fluorescent, have raised tremendous attention in the biomedical field thanks to the size-tunability of their physical properties and to the possibility to engineer their surface with a large variety of biomolecules. High quality materials are generally synthesized through thermal decomposition in a mixture of organic surfactants, thus leading to nanoparticles non soluble in aqueous environment. Several water solubilization chemistries have been developed, but many of them suffer of high selectivity to the particle surface and poor colloidal stability. We present a polymer coating approach as a versatile and robust procedure that can be easily extended to any kind of particle, regardless of the composition or the shape. Indeed the polymer shell can act as a chemical platform for the functionalization of the nanoparticle surface with organic compounds (like fluorophores) or with biomolecules. We show the preparation of water soluble iron oxide nanoparticles with a fluorescent polymer shell or with a tunable surface charge, and the bioconjugation of small (folic acid and TAT peptide) and large (antibodies) biomolecules to polymer coated iron oxide nanoparticles and fluorescent quantum rods. The in vitro cellular studies and the biological applications of the bio-functional nanoprobe are also presented.

Author did not supply full text of the paper/poster