Functional nanomaterials for biosensor and bone regeneration

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Engineered nanomaterials are resources designed at the molecular (nanometer) scale to take advantage of their small size and novel properties which are generally not seen in their conventional bulk counterparts. The two main reasons why nanomaterials can have different properties are: (i) the increase of relative surface area and (ii) the quantum confinement effects leading to novel optical, electrical and magnetic behaviors. In order to apply these nanomaterials in biofields and to increase the throughput of biobased nanostructured materials and devices for energy, environmental and health applications, an efficient immobilization of the biomolecules is needed by the control of the interfaces between the nanostructures and the immobilized biomaterials.

Here, we used different synthesis techniques [1-3] as the main tools for the creation of controlled nanostructured materials and interfaces in which the geometry can be tuned accurately and the dependence of the physical-chemical properties on the geometric parameters can be studied systematically in order to investigate their performances mainly in health applications.

We will show examples of how these methods can be used to create: (i) optical and electrochemical biosensors [4] and (ii) bionanocomposites materials for tissue engineering in which the performance varies with the nanostructures/interfaces [5].

This work opens perspectives for the use of these materials for industrial applications.

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