



# UNIVERSITÀ DEGLI STUDI DI MILANO

## SEMINARI CHIMICI

*Via Venezian 21 - 20133 Milano*

Data **Venerdì 1 febbraio 2013, ore 11.30, Aula G 23**  
Nuovo Settore Didattico

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Titolo **Polymer Based Platforms for Tissue  
Regeneration**

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### Abstract

In biological and medical applications, the capability of controlling physical and chemical interactions at the level of natural building blocks, from proteins to cells, is necessary to offer a more efficient exploration, manipulation, and application of living systems and biological phenomena. In this context, nano-structured biomaterials in the form of nanoparticles, nanofibres, nanosurfaces, and nanocomposites have gained increasing interest in regenerative medicine because they often mimic the physical features of natural extracellular matrix (ECM) at the nanoscale level. Besides, nanotechnology is an important tool in scaffold design to reproduce the features of microenvironment-mediated signaling which determine tissue specificity and architecture of native tissues. Currently, an important class of nano-structured biomaterials on which intensive research has been carried out, is composed of nanofibrous materials, especially biodegradable polymer nanofibres, able to morphologically mimic the fibrillar structure of ECM. In this regard, the electro-spinning represents a powerful strategy to develop biomimetic fibrous material to be efficaciously used as scaffold for the ECM.

The design of different bioactive polymer based structures to develop scaffolds for the regeneration of different tissues such as bone, nerve and myocardium, will be discussed. The optimization of morphological features of fibre network and matrices allows to drive the biological response (i.e, adhesion, proliferation and differentiation) of hMSC while the gradual transmission of biochemical and biophysical signals due to the blending of different polymer phases (i.e, Gelatin, polyaniline), assures the true mimicking of natural ECM functions.