



**University of Naples Federico II**  
**Department of Pharmacy**  
*Doctoral Course in Pharmaceutical Sciences XL Cycle*



**DEVELOPMENT OF INNOVATIVE PEPTIDE-BASED MATERIALS FOR APPLICATIONS IN NANOMEDICINE**

TUTOR: Prof Antonella Accardo and Co-Tutor: Dr. Carlo Diaferia

The discovery that the polypeptide chain has a remarkable and intrinsic propensity to form stable  $\beta$ -rich amyloid-like aggregates is one of the most relevant breakthroughs of the last decades in protein/peptide chemistry. Recently, this property has been exploited to develop new biomaterials of biotechnological and biomedical interest. In this context, the present research project is aimed to design, synthesize, and characterize peptide sequences able to generate innovative self-assembled materials (micelles, fibers, films, hydrogels and nanogels) for application in nanomedicine such as drug delivery, tissue engineering and bioimaging. For example, injectable nanoparticles, designed in order to have one or more positive, net charges could be exploited as potential in vivo delivery systems of nucleic acids for application in Gene Therapy and RNA-based medicine. Peptide sequences will be chosen looking at the natural, biologically relevant proteins or designed ex-novo using molecular dynamic approaches and could contain both natural and unnatural amino acids. Synthetic peptides will be eventually derivatized with polymers in order to enhance the performance of the resulting materials.