



## Thesis Project Form

**Title (tentative):** Development of novel nanoparticle-based strategies for bacterial biofilm removal

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### Description

#### Motivation and application domain

Healthcare associated infections pose an important cause of mortality, morbidity, and prolonged hospitalization. Bacteria can adhere to surfaces and aggregate forming a complex structure, called biofilm, that consists mainly in extracellular polymeric substances, and provides a favorable environment for the formation and spreading of bacterial colonies. As consequence, the concentration of antibiotics needed to eradicate a biofilm is up to a 1000-fold higher than the one needed to kill planktonic cells. It is clear, from this scenario, the urgent need to explore innovative strategies for the treatment of biofilm infections.

#### General objectives and main activities

The main objective of this thesis work is to develop and test a nanoformulation, based on polymeric nanoparticles integrating antimicrobial agents, capable to eradicate bacterial biofilms

Activities will regard both the synthesis and characterization of the nanoformulation as well the in vitro validation on bacterial biofilms.

Characterization will be mainly based on atomic force microscopy in order to get high resolution images of the biofilm topography and to measure the mechanical properties of its different components.

#### Training Objectives (technical/analytical tools, experimental methodologies)

The student will learn:

- how to work in a chemical/biomedical lab safely and independently;
- how to operate an atomic force microscope to perform high resolution imaging and mechanical characterizations;
- how to design an experiment and analyse measurements and critically evaluate results

**Place(s) where the thesis work will be carried out:** DIBRIS

### Additional information

**Maximum number of students:** 1