



Design new non-release bioactive nano-agents to provide long-lasting antimicrobial surfaces

Place of work/: The work will be mainly performed at the Laboratory 8.6.42 (BioISI) and with some training stages at the *Laboratório de análises* do IST - LAIST (<https://la.tecnico.ulisboa.pt/>)

Supervisors:

BioISI: Elisabete R. Silva (Ciência Vitae: <https://www.cienciavitae.pt/portal/9F18-E2D0-58B2>)

LabIST: Ricardo Santos (Ciência Vitae: <https://www.cienciavitae.pt/portal/041F-9BB4-613E>)

Contact: ersilva@fc.ul.pt (Elisabete R. Silva)

Abstract / MSc thesis project proposal

Pathogenic microorganisms accommodated in biofilms on surfaces are a global concern for all societal infrastructures, for example, water utility management systems (e.g., water distribution and treatment). Biofilms lead to serious consequences, including premature biocorrosion and waterborne biothreats, posing a major risk to industrial systems sustainability and public health, and its disinfection is recognized as a critical and challenging process. The most effective bio-decontamination strategies include the controlled release of toxic and cumulative bioactive agents into the aquatic environment, which has a limited life cycle and brings ecological issues. This work aims at contributing to overcoming these decontamination strategies challenges, by providing novel approaches for the immobilization of commercial biocidal agents on the surface of metal oxide nanoparticles, allowing their bioactivity to be amplified, particularly for major pathogenic microorganisms, including bacteria and/or virus, and generated without leaching agents into aquatic media, extending their potential application.

The key workplan activities comprises:

- (i) Surface design through the modification of nanoparticles (NPs) with bioactive agents;
- (ii) Physicochemical characterization of the NPs (e.g., XRD, DRIFT, SEM, elementary analysis, BET);
- (iii) Antimicrobial susceptibility and ecotoxicity evaluation of (un)modified NPs;
- (iv) Ultimately the most promising NPs will be immobilised in a commercial coating to coat small prototypes for proof-of-concept under simulated conditions;
- (v) Dissemination of the work, which may include contributions and participation in events/training actions and writing the thesis.

