Universidad de Navarra
Facultad de Ciencias

MÁSTER EN INVESTIGACIÓN BIOMÉDICA
Research Project Proposal
Academic year 2024-2025

Project Nº 42

Title: *Self-Assembled Photoswitchable Fluorescent Bacteria for Information Encoding.*

Department/ Laboratory *Laboratory where the project will be carried out indicating Department, Area, Faculty, CUN, CIMA etc.*
Departamento de Química (research group SUMBET)

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Summary *:*

The TFM project aims to create a sustainable alternative for information encoding based on bacteria expressing the photoswitchable, convertible protein *Dreiklang*. *Dreiklang* can be converted between two luminescent states and thus be used as a reversible marker. However, the use of *Dreiklang* for applications in material science is hampered by its inherent instability. Thus, the project aims to use *Dreiklang* inside its natural environment, bacteria, not only to protect it but also to avoid the need of expensive and time-consuming protein purification steps.

Bacteria expressing *Dreiklang* will be self-assembled with polysaccharides, such as pullulan or alginate, in the presence of Tetronics, a family of amphiphilic block copolymers of polyethylene oxide and propylene oxide as plasticizing agents to obtain flexible materials upon drying. Additionally, microparticles made of the electrostatic self-assembly of bacteria with positively charged polyelectrolytes will be evaluated to compare their performance with the previous formulation.

Specific objectives are:

- Expression of *Dreiklang* in bacteria
- Production and characterization of pullulan-based films
- Production and characterization of alginate-based films
- Production and characterization of electrostatic self-assembled films

The TFM project is framed into a wider line of research on protein engineering. If you are interested in pursuing a doctorate after the finalization of the MSci, please contact the supervisors of this project.

yes	
no	X

Does the project include the possibility of supervised animal manipulation to complete the training for animal manipulator?