MARIE SKŁODOWSKA-CURIE INDIVIDUAL FELLOWSHIPS 2019

EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

HOST INSTITUTION

NOVA School of Science and Technology | LAQV – Associated Laboratory for Green Chemistry

RESEARCH GROUP AND URL

CleanMIPTech group
https://sites.fct.unl.pt/clean-mip-tech/home

SUPERVISOR (NAME AND E-MAIL)

Teresa Casimiro
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SHORT CV OF THE SUPERVISOR

T. Casimiro completed her PhD in Chemistry, Physical Chemistry at FCT-UNL in 2003. Afterwards, she had a short postdoc and become auxiliary researcher at REQUIMTE in 2006. Her work has been funded by several projects which allowed to conduct her independent research on the development of affinity polymers. In 2014, she was awarded with a development researcher grant in Engineering and Technology, under the IF FCT Investigator program, thus since February 2015 she is principal investigator at LAQV-REQUIMTE, leading the CleanMIPTech group at the Green Polymer Synthesis and processing Lab at LAQV-REQUIMTE.
In 2008 she was part of the team that won the SHIC Solvay-Hovione award in 2008, and she was awarded again in 2011 as PI. This last award led her to have a collaboration and a joint PhD student with Hovione.
She is guest Editor of the journal Polymers and Editor of Advances in Polymer Technology.
Her main line of research interests includes the development of innovative and more sustainable processes using high pressure CO_2 technology for the production of synthetic affinity devices with application in wide range of fields, since drug delivery, sensors and (bio) purification.

5 SELECTED PUBLICATIONS

- Raquel Viveiros, Silvia Rebocho, Teresa Casimiro, Green Strategies for Molecularly Imprinted Polymer Development, *Polymers*, **2018**, 10(3), 306:1-27, https://doi.org/10.3390/polym10030306.

- Gonçalo Marcelo, Inês C. Ferreira, Raquel Viveiros, Teresa Casimiro, Development of itaconic acid-based molecular imprinted polymers using supercritical fluid technology for pH-triggered drug delivery, *International Journal of Pharmaceutics*, **2018**, 542, 125-131, https://doi.org/10.1016/j.ijpharm.2018.03.010.

- Silvia Rebocho, Cristina Cordas, Raquel Viveiros, Teresa Casimiro, Development of a ferrocenyl-based MIP in supercritical carbon dioxide: Towards an electrochemical sensor for bisphenol A, *The Journal of Supercritical Fluids*, **2018**, 135, 98-104, https://doi.org/10.1016/j.supflu.2018.01.006.

- Raquel Viveiros, Maria Inês Lopes, William Heggie, Teresa Casimiro, Green approach on the development of lock-and-key polymers for API purification, *Chemical Engineering Journal*, **2017**, 308, 229-239, https://doi.org/10.1016/j.cej.2016.09.040.

- Raquel Viveiros, Kal Karim, Sergey A. Piletsky, William Heggie, Teresa Casimiro, Development of a molecularly imprinted polymer for a pharmaceutical impurity in supercritical CO_2: Rational design using computational approach, *Journal of Cleaner Production*, **2017**, 168, 1025-1031, https://doi.org/10.1016/j.jclepro.2017.09.026.

PROJECT TITLE AND SHORT DESCRIPTION

Development of artificial antibodies using clean technologies for application in bio-purification processes

Biopharmaceuticals have gained special attention because of their high efficacy and action, producing fewer side effects and also being able to cure diseases rather than treat only the symptoms. Combining these benefits with the increasing number of diseases that can be treated with biopharmaceuticals around the world has boosted the emergence of this new generation of drugs. However, the purification process of the bioreactors has several limitations such as the use of membranes to recover the cells used, followed by several cycles of chromatography to remove impurities and achieve a high degree of purity in biopharmaceuticals. This process involves several steps and is a very intense and time consuming process. To address this need, a new class of smart polymers will be developed using green technologies for application in biopurification in a pharmaceutical context to replace the chromatography steps. The development of prototypes based on polymer particles of artificial antibodies - porous 3D structures (monoliths, membranes or columns) will be designed to remove the impurities in a single step at the end of the biopurification process. For this, they will be tested and evaluated with real crudes and model blends.
The host group develops new polymeric matrices with molecular recognition ability by using a molecular imprinting technique in supercritical carbon dioxide. Supercritical fluid technology is a green technology that brings key features to the polymers such as high purity, which are obtained completely free of organic solvents, and ready-to-use materials by simple depressurization of the reactor at the end of polymerization, being the solvent - the carbon dioxide- released as gas. Affinity cavities are built within the polymer which are complementary in size, conformation and functionality with the target molecule for which the affinity is wanted. Different applications have been explored such as sensors, drug delivery, chromatography, API purification, etc. New applications and novel synthetic approaches will be explored.
The postdoc students with different backgrounds are welcome: chemical and biochemical engineering, material sciences, organic chemistry, pharmaceutics, etc.

SCIENTIFIC AREA WHERE THE PROJECT FITS BEST

Chemistry (CHE) | Information Science and Engineering (ENG) | Life Sciences (LIF)