MARIE SKŁODOWSKA-CURIE POSTDOCTORAL FELLOWSHIPS 2025

EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

HOST INSTITUTION

NOVA School of Science and Technology (NOVA-FCT)
LAQV – Associate Laboratory for Green Chemistry

RESEARCH GROUP AND URL

CHARM – Cultural Heritage and Responsive Materials

SUPERVISOR (NAME AND E-MAIL)

Artur J. Moro (artur.moro@fct.unl.pt)

SHORT CV OF THE SUPERVISOR

Artur Jorge Carneiro Moro completed his degree in Applied Chemistry in 2006 at NOVA University of Lisbon, and his Ph.D. in Chemistry in 2010 at the Friedrich-Schiller-Universität Jena (Germany) as a Marie Curie Fellow within a European Research Training Network. In 2011, he was awarded an Individual Post-doctoral Fellowship from FCT-MCTES, returning to his alma mater. He is currently a Researcher at LAQV - Associate Laboratory for Green Chemistry, featuring as co-author in over 50 articles in internationally peer-reviewed journals and 2 book chapters. He organized two international conferences and is the current representative of LAQV researchers in the Chemistry Department Board at FCT-NOVA, and Chair of SciNOVA (Researchers Association of NOVA-FCT). As an experienced member at the "Cultural Heritage And Responsive Materials" group (CHARM) at FCT-NOVA, he is currently engaged in several projects, with special focus on luminescent sensors and materials towards detection and quantification of metal ions, as well as other biologically relevant anions.

5 SELECTED PUBLICATIONS

- Moro A.J.*, Cywinski P.J., Körsten S., Mohr G.J. – “An ATP Fluorescent Chemosensor Based on a Zn(II)-Complexed Dipicolylamine Receptor Coupled with a Naphthalimide Chromophore“, Chem. Commun. 2010, 46, 1085.
- Moro A.J.*, Avó J., Malfois M., Zaccaria F., Fonseca-Guerra C., Caparrós F.J., Rodríguez L., Lima J.C. – “Aggregation induced emission of a new naphthyridine-ethynyl gold(I) complex as a potential tool for sensing guanosine nucleotides in aqueous media”, Dalton Trans. 2020, 49, 171.
- Gomes L.J., Moreira T., Rodríguez L., Moro A.J.* – “Chalcone-based fluorescent chemosensors as new tools for detecting Cu2+ ions”, Dyes Pigm. 2022, 197, 109845.
- Karkosik A., Moro A.J.* – “An NIR Emissive Donor-p-Acceptor Dicyanomethylene-4H-Pyran Derivative as a Fluorescent Chemosensor System towards Copper (II) Detection”, Chemosensors 2022, 10, 343
- Gomes L.J., Carrilho J.P., Pereira P.M., Moro A.J.* – “A Near InfraRed Emissive Chemosensor for Zn2+ and Phosphate Derivatives Based on a Di-(2-picolyl)amine-styrylflavylium Push-Pull Fluorophore”, Sensors 2023, 23, 471.

PROJECT TITLE AND SHORT DESCRIPTION

Lithium Ion Fluorescent Sensors and Materials for Clean and Sustainable Processes

Lithium has become one of the most important energetic resources over the past few decades, due to its widespread use in the manufacture of batteries worldwide. Extraction and processing of lithium has a **significant negative impact** on the surrounding environment, due to (i) its high **toxicity** towards living wildlife and flora [1], and (ii) the waste of drinking water sources in this process [2]. Additionally, lithium is used as a mood-stabilizing medication for **treatment of bipolar and major depressive disorders**, and monitoring lithium levels for patients undergoing treatment is essential to **prevent overdosage** [3].
Fluorescence spectroscopy may provide the tools towards a fast, highly sensitive and portable methodology for determining lithium content in different aqueous matrixes, whether they be extraction brines from lithium mining processes or bodily fluids (plasma, urine, blood).
The present project is aimed at developing new **fluorescent chemosensor** molecules and materials, capable of **rapid response** in analysis of different samples/matrixes, as opposed to the current standard techniques (ICP-AES or AAS), that require complex pre-treatment steps and/or expensive equipment.[3]
Newly-designed chemosensors will consist of highly luminescent fluorophores, bearing lithium binding motifs in their structure which, upon metal coordination, will change their optical properties (absorption and/or emission) and permit quantification of lithium ions in aqueous media.
Furthermore, these chemosensor structures will also be incorporated into **polymeric matrixes/membranes** and **nanoparticles**, to provide additional chemical stability and a solid support
for reusability of the sensor system.
The relevance of lithium as a valuable energy and economic resource in Portugal highlights the potential impact of these products for (1) **optimization of lithium extraction** processes, and (2) **environmental control of water** resources in the surroundings of lithium mining facilities, ensuring the safety of these processes for our Society.

[1] N. Bolan *et al.*, Environ. Pollut. 2021, 290, 118067.
[2] R. B. Kaunda, J. Energy Nat. Resour. 2020, 38, 237.
[3] M. N. Sweilam *et al.*, ACS Sens. 2018, 3, 1802.

SCIENTIFIC AREA WHERE THE PROJECT FITS BEST*

Chemistry (CHE)