



UNIVERSIDADE  
**NOVA**  
DE LISBOA

**MARIE SKŁODOWSKA-CURIE INDIVIDUAL FELLOWSHIPS 2018**  
**EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS**

**HOST INSTITUTION**

School of Sciences and Technology | UCIBIO & NOVALINCS Research Units

**RESEARCH GROUP AND URL**

Bionanolab – <http://www.requimte.pt/ucibio/research-groups/lab/bionano>

Knowledge-Based Systems - <http://nova-lincs.di.fct.unl.pt/research/knowledgebased-systems>

**SUPERVISOR (NAME AND E-MAIL)**

Ricardo Franco - [ricardo.franco@fct.unl.pt](mailto:ricardo.franco@fct.unl.pt) | Ludwig Krippahl - [ludi@fct.unl.pt](mailto:ludi@fct.unl.pt)

**SHORT CV OF THE SUPERVISOR**

**RICARDO FRANCO**

2016 – Agregação/Habilitação – FCT/UNL, Portugal – Biochemistry/Physical Biochemistry;

1995 – Ph D – FCT/UNL, Portugal – Bioinorganic Chemistry;

1989 – FCT/UNL, Portugal – Five-year degree in Applied Chemistry – Biotechnology;

Previous and current scientific and/or professional activities

4/2000 to present – Assistant Professor with Habilitation, Chemistry Department; Leader of the BioNanoLab research Group, UCIBIO, REQUIMTE, FCT/UNL, Caparica, Portugal.

Researcher ID (Thomson Reuters): <http://www.researcherid.com/rid/C-5247-2008>

ORCID: <http://orcid.org/0000-0002-5139-2871>

Scopus Author ID: 7202551051; 1928 citations; H index = 25

**LUDWIG KRIPPAHL**

2003 - Ph.D. in Structural Biochemistry by Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, with the dissertation “Integrating Protein Structural Information”;

2000 - M.Sc. in Applied Artificial Intelligence by Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, with the dissertation “Application of Constraint Programming to Protein Structure Determination by Nuclear Magnetic Resonance”;

1997 - B.Sc. (Licenciatura) in Applied Chemistry (Biotechnology) by Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa

<http://userweb.fct.unl.pt/~a4338/>



## 5 SELECTED PUBLICATIONS

### RICARDO FRANCO

- “Gold nanoparticles for the development of Clinical Diagnosis methods” Pedro Baptista, Eulália Pereira, Peter Eaton, Gonçalo Doria, Adelaide Miranda, Inês Gomes, Pedro Quaresma and Ricardo Franco; *Anal. Bioanal. Chem.* (2008) 391, 943–950; DOI: 10.1007/s00216-007-1768-z;
- “Gold nanoparticles as (bio)chemical sensors” Miguel Peixoto de Almeida, Eulália Pereira, Pedro Baptista, Inês Gomes, Sara Figueiredo, Leonor Soares and Ricardo Franco, In *Comprehensive Analytical Chemistry. Gold Nanoparticles in Analytical Chemistry* (2014) Valcárcel M, López-Lorente A.I. (eds.), 1st ed., Vol. 66, pp. 529–567, Elsevier, Amsterdam, Netherlands, ISBN: 978-0-444-63285-2;
- “Star-shaped magnetite@gold nanoparticles for protein magnetic separation and SERS detection”; Pedro Quaresma, Inês Osório, Gonçalo Doria, Patrícia A. Carvalho, André Pereira, Judith Langer, João Pedro Araújo, Isabel Pastoriza-Santos, Luis M. Liz-Marzán, Ricardo Franco, Pedro Baptista and Eulália Pereira; *RSC Adv.* (2014), 4 (8), 3659 – 3667, DOI: 10.1039/c3ra46762g;
- “Unravelling Malaria antigen binding to antibody-gold nanoparticle conjugates” Miguel A. S. Cavadas, Marco P. Monopoli, Cláudia Sá e Cunha, Miguel Prudêncio, Eulália Pereira, Iseult Lynch, Kenneth A. Dawson and Ricardo Franco; *Part. Part. Syst. Charact.* (2016) 33 (12), 906–915, DOI: 10.1002/ppsc.20160018;
- “Office paper decorated with silver nanostars - an alternative cost effective platform for trace analyte detection by SERS” Maria João Oliveira, Pedro Quaresma, Miguel Peixoto de Almeida, Andreia Araújo, Eulália Pereira, Elvira Fortunato, Rodrigo Martins, Ricardo Franco and Hugo Águas; *Sci. Rep.* (2017) 7, 2480 DOI:10.1038/s41598-017-02484-8.

### LUDWIG KRIPPAPHL

- 2000 PN Palma, L Krippahl, JE Wampler, JGG Moura, BiGGER: a new (soft) docking algorithm for predicting protein interactions *Proteins: Structure, Function, and Bioinformatics* 39 (4), 372-384;
- 2002 L Krippahl, P Barahona, PSICO: Solving protein structures with constraint programming and optimization *Constraints* 7 (3-4), 317-331;
- 2003 L Krippahl, JJ Moura, PN Palma Modeling protein complexes with BiGGER, *Proteins: Structure, Function, and Bioinformatics* 52 (1), 19-23;
- 2007 S Monaco, M Gioia, J Rodriguez, GF Fasciglione, D Pierro, G Lupidi, L Krippahl, S Marini, M Coletta, Modulation of the proteolytic activity of matrix metalloproteinase-2 (gelatinase A) on fibrinogen *Biochemical Journal* 402 (3), 503-513;
- 2011 C Milheirico, A Portelinha, L Krippahl, H de Lencastre, D Oliveira, Evidence for a purifying selection acting on the beta-lactamase locus in epidemic clones of methicillin-resistant *Staphylococcus aureus*, *BMC microbiology* 11 (1), 76.



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## PROJECT TITLE AND DESCRIPTION

### ***Interaction between Gold Nanoparticles and Blood Proteins to define Disease states – a mixed experimental and computational approach***

The Objectives of this Project are to evaluate the interaction between Gold Nanoparticles (AuNP) with different functionalizations, and plasma proteins. The plasma proteins can be in pure solutions or in complex mixtures, up to clinical samples from patients with conditions known to affect plasma protein's profiles. To fulfill the proposed objectives, the Project will use a complementary approach involving "wet" laboratory work (Prof. Ricardo Franco, UCIBIO, FCT-NOVA Caparica) and computational simulation studies (Prof. Ludwig Krippahl, NOVA-LINCS, FCT-NOVA Caparica). Binding constants and kinetic parameters between the different plasma proteins and particular AuNPs surfaces will be determined and compared. Conclusions from this study will impact in the use of plasma protein affinity profiles to AuNPs, as a non-invasive diagnostic methodology for important diseases.

#### SCIENTIFIC REQUIREMENTS

The sought profile is for a motivated and driven individual, eager to learn new techniques, and with excellent capacity for independent work, both in the laboratory and in paper-writing settings. General laboratory skills in Biochemistry are required (namely, electrophoresis, column chromatography, UV/visible and fluorescence spectroscopies). Candidates with previous work on the (bio)nanotechnology area are especially encouraged to apply, although application of candidates with no previous experience in the area will also be carefully considered.

## SCIENTIFIC AREA WHERE THE PROJECT FITS BEST

Chemistry (CHE) • Life Sciences (LIF)

## OTHER RELEVANT INFORMATION

AuNPs with different morphologies and surface functionalizations are available from a collaboration with Prof. Eulália Pereira – REQUIMTE/LAQV, FCUP, Porto. Real samples from patients with pre-known conditions will be obtained as part of a collaboration set in place with the local Garcia de Orta Hospital, in Almada (near the FCT-NOVA Campus).