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## MARIE SKŁODOWSKA-CURIE INDIVIDUAL FELLOWSHIPS 2018

### EXPRESSION OF INTEREST FOR HOSTING MARIE CURIE FELLOWS

#### HOST INSTITUTION

NOVA School of Science and Technology | CEFITEC - Centre of Physics and Technological Research

#### RESEARCH GROUP AND URL

CEFITEC - Centre of Physics and Technological Research  
<https://www.cefitec.fct.unl.pt/>

#### SUPERVISORS (NAME AND E-MAIL)

Orlando Teodoro – [odt@fct.unl.pt](mailto:odt@fct.unl.pt) | Nenad Bundaleski - [n.bundaleski@fct.unl.pt](mailto:n.bundaleski@fct.unl.pt)

#### SHORT CV OF THE SUPERVISOR

##### ORLANDO TEODORO

Orlando is graduated and has a PhD (1998) in Engineering Physics. He is the Director of the Laboratory for Vacuum Technology and Metrology (Accredited by ISO17025) and the group leader of the Surface Science and Engineering group at CEFITEC.

His main scientific interests are in field of vacuum science and technology and surface characterization techniques (mainly SIMS, XPS, AES and ISS). He also concerns with the project and development of scientific equipment.

He authors or co-author of about 100 papers published in peer-reviewed scientific journals and about 160 communications in conferences. He leads many national research projects and worked in several European projects always on the fields of surface science or vacuum technology and metrology.

His actual interests are focused on applications as scientific instruments or in vacuum technology based processes to clean or to analyze cork.

##### NENAD BUNDALESKI

Nenad Bundaleski graduated in 1996. at the School of Electrical Engineering (Physical Electronics Department), Belgrade University, Serbia. His Master and PhD theses, realized at the Institute of Nuclear Sciences 'Vinča', were related to the building of an experimental setup for studying low energy ion surface scattering and implementation of this technique for surface characterization.

During the postdoc studies in Orsay, France (2007-2009), performed experimental and theoretical study of the fast atom diffraction at grazing incidence, being a novel manifestation of quantum mechanics at that time. Studying interaction of highly charged ions with dielectric surfaces and monitoring their charging dynamics was another experiment accomplished during this specialization.

The next step in professional development was joining Centro de Física e Investigação Tecnológica (CeFiTec) in the frame of the Ciência 2008 program. This work was related to diverse surface science projects. Majority of them were more or less related to secondary electron emission and surface characterization using XPS. Numerous collaborations with different groups in this respect, provided hands on practice in characterisation of various surfaces and nanoparticles, and resulted in gaining extensive experience in XPS analysis. The investigations conducted exclusively in the group and supervised by the candidate were mainly related to the



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investigation of the secondary electron emission and the surface science of TiO<sub>2</sub>. This included advising of several Master and PhD students and co-supervising one PhD student.

In 2014 returned to the 'Vinča' Institute in Belgrade, acquiring the position of Research Professor. After the second arrival in CeFiTec, the candidate continued his previous work, including the supervision of Master students and co-supervising one PhD student at Belgrade University. Currently, his main focus is on the ion induced secondary electron emission, in the frame of the EMPIR project, on the secondary electron yield from graphene, and XPS analysis of nanostructured materials such as graphene, noble metal nanoparticles embedded in dielectrics, etc.

## 5 SELECTED PUBLICATIONS

- J. Trigueiro, W. Lima, N. Bundaleski, O.M.N.D. Teodoro, XPS spectrometer transmission function optimization by the differential evolution algorithm, *J. El. Spec. Rel. Phenom.* 222 (2018) 122-132.
- Tolstogouzov, A.; Aguas, H.; Ayouchi, R.; Belykh, S. F.; Fernandes, F.; Gololobov, G. P.; Moutinho, A. M. C.; Schwarz, R.; Suvorov, D. V.; Teodoro, O. M. N. D. Vacuum solid-state ion-conducting silver source for application in field emission electric propulsion systems. *Vacuum* 2016, 131.
- N. Bundaleski, J. Trigueiro, A.G. Silva, A.M.C. Moutinho, O.M.N.D. Teodoro, Influence of the patch field on work function measurements based on the secondary electron emission, *J. Appl. Phys.* 113, 183720 (2013).
- N. Bundaleski, M. Belhaj, T. Gineste, O.M.N.D. Teodoro, Calculation of the Angular Dependence of the Total Electron Yield, *Vacuum*, 122 (2015) 255-259.
- N. Bundaleski, H. Khemliche, P. Soullisse, P. Roncin, Grazing incidence diffraction of keV Helium atoms on a Ag(110) surface, *Phys. Rev. Lett.*, 101, 177601, (2008)

## PROJECT TITLE AND DESCRIPTION

### *Alternative design for an Ionization Gauge*

The ionisation gauge is the only vacuum gauge type for high and ultrahigh vacuum. High and ultrahigh vacuum is an indispensable tool for science and industry. Fields of application for science include high-energy accelerators, plasma and fusion science, surface science, and thin film studies, which have a great impact on industry, e.g. optics, optoelectronics, and solar cells. The main limitation for all existing ionization gauges is its lack of long-term stability leading to a high uncertainty of the vacuum measurement. The reasons for this have been identified and are related with its conceptual design and geometry.

In the frame of this work, an alternative design will be proposed together with an improved selection of materials. The idea is twofold: hide the ion collector from all electron collisions spots and use materials which are known to generate less secondary particles as electrons, X-rays and desorbed ions.

This work will be part of a running European project in which the new design will be thoroughly tested and refined.

### SCIENTIFIC REQUIREMENTS

The candidate should have a good background in experimental physics preferentially including vacuum technology and surface science.

## SCIENTIFIC AREA WHERE THE PROJECT FITS BEST

Chemistry (CHE)