



HELLENIC REPUBLIC
MINISTRY OF EDUCATION, RESEARCH & RELIGIOUS AFFAIRS
GENERAL SECRETARIAT FOR RESEARCH & TECHNOLOGY

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FORTH

FOUNDATION FOR RESEARCH & TECHNOLOGY - HELLAS
INSTITUTE OF CHEMICAL ENGINEERING SCIENCES

Patras, 23/6/17

Ref. No.: 1529

Invitation for Expression of Interest:

Ph.D. Fellowship “Synthesis and advanced characterization of novel solid lubricant coatings based on transition metal dichalcogenides”

The Institute of Chemical Engineering Sciences, Foundation of Research and Technology - Hellas, (FORTH/ICE-HT) is seeking applicants for one position of PhD Fellowship in the context of the research project “*SOLUTION, an Innovative Training Network in the frame of the MARIE SKŁODOWSKA-CURIE ACTIONS of Horizon 2020*”, which is funded by the European Commission.

SOLUTION is made up of 8 partners, coordinated by the University of Southampton (UK). The network will offer 14 early-stage researcher (ESR) positions in a broad area of atomistic simulations, nanoscale investigation of 2D materials, development of novel solid lubricants and their application in an engineering practice.

The advertised subproject will be carried out by one postgraduate (ESR) at the Institute of Chemical Engineering Sciences / Foundation for Research & Technology, Hellas over a period of 36 months.

Job Description

Despite that solid lubricants operate at conditions where liquids fail, they cannot yet tackle the dominant issue in tribology, i.e. that no single material can lubricate efficiently beyond a narrow temperature and humidity range. The current doctoral position is an employment within the research project "Solid lubrication for emerging engineering applications". The central aim of this PhD thesis is to explore novel solid lubricant materials based on layered crystals such as transition metal dichalcogenides (TMDCs) of the form MX_2 (M: Mo, W, Ta, etc., and X: S, Se, Te), which will outperform current commercially available solutions. The project comprises a hierarchical approach. Materials synthesis will mainly take place via high-temperature thermal evaporation techniques such as physical and chemical vapor deposition (PVD, CVD) onto various substrates. Emphasis on materials synthesis will be placed on **(i)** the control of the number of layers, **(ii)** the doping (substitution) of the transition metal with other atoms creating structures with different lattice dynamics, **(iii)** the synthesis of vertically stacked heterostructures of various TMDCs, **(iv)** the growth of mixed transition metal and/or mixed chalcogen crystals. Advanced physicochemical characterization will take place with electron microscopies (SEM, TEM), optical spectroscopies (Raman and Photoluminescence spectroscopy), and surface sensitive techniques (XPS/UPS). Tribological

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characterization will be performed at the nanoscale by using Atomic Force Microscopes (AFM) for lateral force measurements (LFM), as well as at the macroscale by using pin-on-disk tribometers. The effect of extreme conditions (e.g., temperature, load, different atmospheres) will also be studied.

Location: FORTH/ICE-HT, Patras, Greece

Expected start date: 1st of September, 2017 (tentative)

Duration: up to 36 months

Gross Salary: 2.796,22 € (Living & Mobility allowances). Plus 500 € / month (if they are married and/or have dependent children)

Requirements and Qualifications

Early-stage researcher: a researcher without a PhD, who is in the first four years (full-time equivalent research experience) of his/her research career, measured from the date when he/she obtained the degree which would formally entitle him/her to embark on a doctorate.

We invite applications from enthusiastic and self-motivated students with a first degree in Physical Sciences or Engineering who graduated (required) with excellent marks (preferably) from two-year research-track master's programs in Physical Science or Engineering. Very good knowledge of the English language is a requirement.

Mobility: The applicant must not have resided or carried out his/her main activity (work, studies etc.) in Greece for more than 12 months in the past three years.

The evaluation of the candidates will be based on the following criteria and qualifications:

Qualifications	Weight	Evaluation criteria
Grade Point Average (G.P.A.) of the first degree and the M.Sc. studies	20%	<i>Diploma grades</i>
Experience in synthesis of TMDCs	20%	<i>Duration of proven research experience in research groups and projects.</i>
Experience in high-temperature thermal evaporation techniques	20%	<i>Duration of proven research experience in research groups and projects.</i>
Experience in tribological characterization of materials	15%	<i>Duration of proven research experience in research groups and projects.</i>
Experience in Raman spectroscopic and surface-sensitive techniques (XPS/UPS)	15%	<i>Duration of proven research experience in research groups and projects.</i>
Participation in conferences and publications in referred journals	10%	<i>Quality and number of related publications in refereed journals and conference proceedings.</i>



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Application Submission

Interested candidates who meet the aforementioned requirements should submit application letter and detailed curriculum vitae (CV), no later than Monday, **July 10th, 2017, 14:00h**, by post or email to Kleanthi Zacharopoulou: kleanthi@iceht.forth.gr. Please quote the reference “SOLUTION”.

Any application received after the deadline will not be considered for the selection.

Contact

For information and questions regarding the application and selection procedure, candidates are asked to contact the FORTH/ICE-HT Research Secretariat, e-mail: kleanthi@iceht.forth.gr, tel.: +30 2610 965278.

For information and questions about the advertised position and the research activity of the group or the Institute, candidates are asked to contact **Dr. Spyros Yannopoulos**, tel: +30 2610 965252, e-mail: sny@iceht.forth.gr.

For FORTH/ICE-HT,

Vasilis Burganos
Director



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