BOOST YOUR CAREER WITH MSCA INDIVIDUAL FELLOWSHIP AT NATIONAL INSTITUTE OF CHEMISTRY, SLOVENIA

H2020 MARIE SKŁODOWSKA CURIE ACTIONS INDIVIDUAL FELLOWSHIP CALL 2020
THE NATIONAL INSTITUTE OF CHEMISTRY (NIC)

With excellent research...

Biotechnology
Life sciences research
Analytical chemistry
Nanotechnology
Food chemistry
Energetics
Theoretical and structural chemistry
Chemical engineering
Materials research

...we create new knowledge and help solving societal challenges.
**WHAT DO THE NIC OFFER YOU WITHIN MSCA IF 2020?**

<table>
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<tr>
<th>Individual Fellowships</th>
<th>IF experienced researchers (&gt; 4 years)</th>
<th>Support for experienced researchers to undertake international and inter-sector mobility, incl. career restart and reintegration</th>
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<tr>
<td>• Prestigious career opportunities</td>
<td>• Individual trans-national post-doctoral fellowships for the best and most promising experienced researchers</td>
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<td>• Excellent working conditions: employment contracts, full social security etc.</td>
<td>• Two types depending on the mobility of the researcher</td>
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<td>• Very competitive salaries</td>
<td>• Within or into Europe - European Fellowships</td>
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<td>• Opportunities to work and train with the best researchers in Europe and worldwide</td>
<td>• Outside Europe - Global Fellowships</td>
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<td>• Whole career training: complementary skills</td>
<td>• Access to top level conferences, professional associations &amp; Marie Curie Alumni</td>
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<td>• MOBILITY: Applicants must not have resided or carried out their main activity in the country of the host organisation for more than 12 months in the 3 years immediately prior to the call deadline</td>
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<td>• SCIENTIFIC DOMAIN: Chemistry (CHE), Information Science and Engineering (ENG), Environment and Geosciences (ENV), Life Sciences (LIF)</td>
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**Individual Fellowships**

**Support for experienced researchers to undertake international and inter-sector mobility, incl. career restart and reintegration**

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<th>Call</th>
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<th>Closes</th>
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<tr>
<td>MSCA IF 2020</td>
<td>8 APRIL 2020</td>
<td>9 SEPTEMBER 2020</td>
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<td>APPLICATION AT NIC: Reach an agreement on the Supervisor and the Topic</td>
<td>WHO? Fellow appy to <a href="mailto:project.office@ki.si">project.office@ki.si</a></td>
<td>DEADLINE 22 MAY 2020</td>
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**Call**

**5 SEPTEMBER 2020**
Submission deadline for NIC Individual Researchers

**1 JUNE – 1 SEPTEMBER 2020**
Proposal preparation by researcher with the support of Supervisor and Project Management Office

**31 MAY 2020**
Eligibility Assessment at NIC Notification of selection

**22 MAY 2020**
Closure NIC MSCA IF Call
Submit the application to the National Institute of Chemistry
PROPOSED RESEARCH TOPICS AT THE NATIONAL INSTITUTE OF CHEMISTRY

TOPIC 1
Designed bionanostructures (protein origami)
SUPERVISOR
Prof. dr. Roman JERALA

TOPIC 2
Cancer immunotherapy
SUPERVISOR
Prof. dr. Albin PINTAR

TOPIC 3
Synthetic biology of mammalian cells – design of signaling pathways
SUPERVISOR
Prof. dr. Blaž LIKOZAR

TOPIC 4
Visible light assisted photocatalysis for water treatment
Materials used as photocatalysts in the process of heterogeneous photocatalytic oxidation must be significantly improved in order to make this process economically attractive. In this respect, novel nanostructured and nanoshaped photocatalysts (including nanoplasmonic solids) will be developed that will allow efficient harvesting of visible light spectrum.
SUPERVISOR
Prof. dr. Blaž LIKOZAR

TOPIC 5
Direct biogas to liquid fuel conversion
Biogas (i.e. a mixture of methane and carbon dioxide) is produced by anaerobic dark fermentation of solid wastes and renewables. Multifunctional heterogeneous catalysts will be developed that will enable efficient and direct transformation of biogas to either dimethylether or methanol in a single reactor unit.
SUPERVISOR
Prof. dr. Blaž LIKOZAR

TOPIC 6
Application of chemical reaction/reactor engineering/multi-scale process modelling to new emerging challenges
• chemical (process) engineering, reactor and unit operation design and construction, as well as multi-scale process modelling.
• carbon dioxide conversion: reverse water–gas shift (RWGS), methanol, formaldehyde, dimethyl ether (DME), carboxylation, etc.
• natural gas conversion: non-oxidative/oxidative methane conversion to ethane, ethylene and others, dehydrogenations, etc.
• electro-catalysis with fuel cell technologies: novel catalyst fabrication, characterisation and application (ORR, HER, CO2RR, etc.).
• biomass valorisation to bio-based compounds: lignin, cellulose, hemicellulose, aromatics, hydroxyl-methyl furfural, furfural, etc.
• (bio)pharmaceutical processes: particle engineering development (e.g. crystallisation), metabolic network modelling, etc.
SUPERVISOR
Prof. dr. Blaž LIKOZAR

TOPIC 7
Synthesis and advanced electrochemical characterisation of low-cost and sustainable electrocatalysts for Fuel Cells/Electrolysers
SUPERVISOR
Prof. dr. Miran GABERŠČEK
PROPOSED RESEARCH TOPICS AT THE NATIONAL INSTITUTE OF CHEMISTRY

**TOPIC 8**
Concentrated Solar Nano Coatings for Electricity production

**TOPIC 9**
- Structural and functional studies of proteins involved in pathogenesis of intracellular bacteria (e.g. Listeria monocytogenes)
- Membrane interactions and mechanism of action of pore forming toxins from all kingdoms of life
- Studies of interactions between proteins and membranes at the structural and functional level
- Evolution of small tightly folded binding modules and ligand binding sites
- Synthetic biology of nanopores
- Structural and functional studies of plant viruses

**TOPIC 10**
Development and application of solid-state NMR methods for the investigations of formation, for structure determination and for in-situ studies of the performance of porous catalysts and adsorbents.

Expertise required by the applicant: basic programming skills (e.g. C, Matlab or similar; familiarity with Linux is an advantage).

**TOPIC 11**
Development of nanoporous materials for heat storage/transformation applications, including design of new porous solids and post-synthesis modification of sorbents

Tailoring of hydrophilic properties of inorganic and metal-organic sorption materials.

**TOPIC 12**
Development of nanoporous materials for carbon capture and utilization (CCSU) technologies

Providing more compact configurations (composite materials, porous monoliths, etc.) to improve the energy and production costs in gas separation and conversion.

Expertise required by the applicant: Laboratory synthesis skills, Understanding/use of characterisation methods (XRD, TG/DSC, SEM, gas sorption).
SUPERVISOR
Prof. dr. Nataša NOVAK TUŠAR

TOPIC 13
Development of multimetal functionalized porous materials for catalytic air and water purification

Metals on porous supports, metals on mixed oxides photocatalyst TiO$_2$/SiO$_2$, double layered hydroxides on porous supports.

Expertise required by the applicant:
Laboratory synthesis skills,
Understanding/use of characterisation methods (XRD, TG/DSC, SEM, gas sorption).

SUPERVISOR
Prof. dr. Robert DOMINKO

TOPIC 14
Artificial SEI on metal lithium

Li-ion batteries are most promising portable storage devices and their energy density can be further improved by replacement of negative electrode by metallic lithium. The latter needs to be protected if we want to avoid formation of dendrites and constant passivation. Protection layers can be based on polymers or alloys.

SUPERVISOR
Prof. dr. Simona GOLIČ GRDADOLNIK

TOPIC 15
The role of protein dynamics at the ligand-protein binding process

The aim of these studies is a site specific characterization of protein dynamic processes in ligand-protein complexes on a wide range time scale at atomic level using spectroscopic methods and molecular dynamics simulations. This is required for the proper understanding of ligand-protein binding mechanisms. In general, the anticipated results will inspire future research of the poorly explored role of dynamics and molecular flexibility in biological processes and can have direct impact on the development of novel therapeutic agents.

SUPERVISOR
Prof. dr. Franci MERZEL

TOPIC 16
Computational characterization of structural dynamics underlying function in proteins

Molecular dynamics simulations and free energy calculations are powerful biophysical tools offering spatial and temporal resolutions that can effectively complement experimental methodologies in studying molecular basis of protein function:
- How hydration water assists protein function?
- How does water pass through membrane transporters (SGLT)?
PROPOSED RESEARCH TOPICS AT THE NATIONAL INSTITUTE OF CHEMISTRY

Prof. dr. Jože GRDADOLNIK

TOPIC 17
Protein aggregation monitored by vibrational spectroscopy
Infrared, micro Raman, VCD, NMR and advanced theoretical methods will be used to study the structural phase transitions of poly-L-lysine and polyglutamate induced by temperature and/or by changing the pH. The stability of peptide structure and intermediates will be tested in the presence of various types of cosolvents. Acquired knowledge from model systems will be applied in the study of amyloid aggregation of insulin, which is related to type I diabetes mellitus.

Prof. dr. Samo HOČEVAR

TOPIC 18
Electrochemical Sensors
- Development of (micro)electrodes and electrochemical (gas)sensors.
- Development of sensing materials and study of electrode processes at nano-scale and in real-time.
- Development of electrochemical methodologies and application studies.

TOPIC 19
Elemental (Bio)Imaging and Chemical Characterization
- Development of 2D/3D elemental (bio)imaging using laser ablation hyphenated with elemental mass spectrometry (LA-ICP-MS).
- Development of methodologies for the analysis of trace elements and organic species in environmental, biological/biomedical and material research (ICP-OES, ICP-MS, LC-MS/MS).

TOPIC 20
Atmospheric Chemistry
- Study of chemical processes in atmospheric aerosols
- Physico-chemical characterization of size-segregated atmospheric (nano) aerosols.
- Development of novel methods for (outdoor & indoor) nanoparticle characterization and study of their transformations.

Nothing in life is to be feared just understood.
- Marie Curie
THERE ARE THREE MAIN REQUIREMENTS OF ELIGIBILITY:

1. **RESEARCHER MUST HAVE A PhD** (OR EQUIVALENT RESEARCH EXPERIENCE OF AT LEAST FOUR YEARS’ FULL TIME RESEARCH EXPERIENCE BY THE TIME OF THE CALL DEADLINE: **SEPTEMBER 9TH 2020**).

2. **RESEARCHER CAN BE OF ANY NATIONALITY BUT MUST NOT HAVE LIVED OR WORKED IN SLOVENIA FOR MORE THAN 12 MONTHS DURING THE THREE YEARS UP TO THE CLOSING DATE OF THE CALL (MOBILITY RULE).**

3. **THE APPLICANTS MUST CHOOSE THE NATIONAL INSTITUTE OF CHEMISTRY, SLOVENIA AS THEIR HOST INSTITUTION.**
HOW TO APPLY?

WE WELCOME APPLICATIONS OF **HIGHLY MOTIVATED EXPERIENCED RESEARCHERS** (WITH A DOCTORAL DEGREE OR AT LEAST FOUR YEARS OF FULL-TIME EQUIVALENT RESEARCH EXPERIENCE) OF **ANY NATIONALITY**.

**NIC CALL CLOSING DATE: 22 MAY 2020**

In order to apply the applicants must choose one of the “Supervisors project proposals” and send the following **three forms** as pdf files to: [project.office@ki.si](mailto:project.office@ki.si) with the **subject**: MSCA-IF2020-Application  
1. Curriculum vitae and publications list 
2. Letter of motivation and research statement (provided template)  
3. Eligibility Self-declaration (provided template)

All forms are compulsory. Applications lacking any document will not be considered.

Fluent knowledge of English language is necessary. Knowledge of Slovenian is not required.
National Institute of Chemistry

Hajdrihova 19
1001 Ljubljana, Slovenia

Webpage: www.ki.si

E-mail: project.office@ki.si

Phone: 00386 (1) 476 0498
Fax: 00386 (1) 476 03 00