HOST OFFERS FROM THE SILESIAN UNIVERSITY OF TECHNOLOGY FOR MARIE SKŁODOWSKA-CURIE INDIVIDUAL FELLOWSHIPS IN HORIZON 2020

HR EXCELLENCE IN RESEARCH

May 2017

The **Silesian University of Technology** (Poland) is searching for **experienced researchers of any nationality** interested in submitting a joint application for the following Horizon 2020 actions:

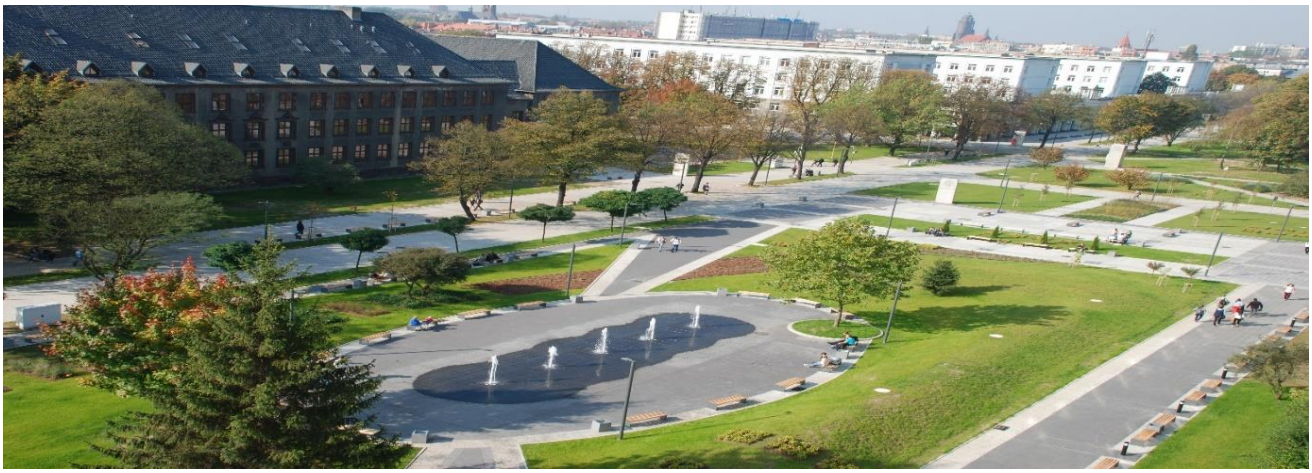
- ✓ **Marie Skłodowska-Curie Individual Fellowships – European Fellowships (MSCA-IF-2017-EF)**
- ✓ **Marie Skłodowska-Curie Individual Fellowships – Global Fellowships (MSCA-IF-2017-GF)**

More information about mentioned IF calls can be found at:

H2020-MSCA-IF-2017

ABOUT THE UNIVERSITY

The Silesian University of Technology (SUT), located in Upper Silesia (Poland), is one of the most prestigious technical universities in Poland, with over 70 years of tradition in education, research and science.



Nowadays, SUT educates over 20,000 students at all three levels of study: bachelor, master and doctoral, mainly in the fields of engineering, technology and architecture. Aside from that, the University also offers courses in administration, mathematics, sociology and management, as well as philology and pedagogy. All of these classes take place in modern laboratories and lecture rooms, and are taught by highly qualified university Staff consisting of 1,750 academic teachers, including 164 professors and 341 assistant professors with Ph.D. degree. The Silesian University of Technology was established as a scientific and didactic base in Upper Silesia, the most industrialized region in Poland and one of the most in Europe. The Silesian University of Technology consists of eleven faculties located in Gliwice, where the University is established, as well as two faculties in Katowice and two in Zabrze.

The mission of the Silesian University of Technology, as a prestigious European technical university, is to conduct innovative scientific research, educate highly qualified staff, and influence the development of the regional and local communities.

Wide range of courses and high quality of education are factors that distinguish the Silesian University of Technology among all technical universities in Poland. Its status is further highlighted by academic achievements of outstanding professionals, both at national and international level.

The University is a key player in the fields of innovation and new technologies, thanks to scientific cooperation with various sectors relevant to economy.

The Silesian University of Technology was granted the **HR Excellence in Research logo**, which is a sign of recognition by the European Commission of the university's efforts to implement the principles adopted in the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers.

OFFERS FROM OUR UNIVERSITY

I. FACULTY OF ARCHITECTURE

SHORT DESCRIPTION:

The Faculty of Architecture is an educational and research unit, with research concerning architecture and urban planning. The Faculty enjoys strong support from local professionals; among the academic staff there are successful practitioners, whose presence enlivens and sharpens the educational environment. The Faculty is entitled to award: B.Sc., M.Sc. and Ph.D. academic degrees in Architecture and Urban Planning. The Faculty has about 80 employees and approx 500 students. The Faculty has hosted numerous events and conferences including BIWA (Interdisciplinary Research in Architecture), RMW (Region-City-Country), ULAR (Urban Landscape Renewal) or TEDxSilesianUniversityofTechnology. We have Erasmus partnerships with over 20 European architecture schools including Vrije Universiteit Brussel, Fachhochschule Aachen, Chalmers University of Technology, Kopenhavens Tekniske Skole, Gazi University Ankara, Izmir institute of Technology. The Faculty of Architecture is a member of AEEA/EAAE – European Association for Architectural Education and ECLAS – European Council of Landscape Architecture Schools. The Faculty of Architecture is situated in the Silesian University of Technology campus, near the historic center of Gliwice.

KEY RESEARCH AREAS:

- Architectural design research - Trends and changes in the Polish architecture, studies on dwellings and commercial buildings and their transformations, technical bases for adaptation of the environment for the disabled people, etc. Housing design, new housing typologies, affordable housing, municipal housing policy, etc.
- Town planning and urban design - dealing with current issues of Silesian municipalities, considering environment protection, landscaping, land use, urban design and masterplanning of new urban areas - neighborhoods, industrial zones, and special zones, such as airport cities.
- Regeneration of post industrial and derelict urban areas - research and design studios in the formula of PBL (Problem Based Learning). The scope of work ranges from identifying potential and problems in a district scale, through formulating regeneration strategies, to solving specific design issues. Numerous projects were completed for Silesian municipalities, as well as organizations such as coal mines, landscape parks etc.
- Qualitative research in built environment, public spaces quality analysis, place-making process analysis through participatory action research with local communities, facility management,ergonomic arrangement of architectural and urban spaces, effectiveness of space use, attractiveness of the customer's position, sustainable development and the impact of climate change on architecture, quality of the internal environment; Used methods and techniques: POE (Post Occupancy Evaluation), Design Thinking and others. Design for an aging society (**http://www.lab60plus.pl/en**).
- Landscape design, Designs of environment protection and biodiversity enrichment, habitat creation, nature valuation, designs of parks and greenery of urbanized areas. Design connected with BREEAM certification.

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www.polsl.pl/en/Pages/RAr.aspx

II. FACULTY OF CIVIL ENGINEERING

SHORT DESCRIPTION:

There are 22 professors and associate professors, and 86 Philosophy Doctors (PhDs) employed at the Faculty. The Research and Development activity of the Faculty comprises all fields connected with civil structure design, building materials and technologies, transportation engineering and infrastructure: development of the theory of structures, reinforced-concrete, prestressed-concrete steel and timber structures, framework building, particularly those exposed to the effects of mining subsidence, testing of soil, foundations and structures, solid body mechanics and mechanical system dynamics in a non-classical approach, scientific basis for exploitation, renovation and conservation, new techniques in bridge construction, exploitation of bridge structures in areas exposed to mining subsidence, transportation infrastructure design and construction, including the development of the theory of pavements and soil improvement techniques in mining subsidence areas, design, construction and exploitation of town infrastructure including the infrastructure subjected to mining subsidence, testing of durability of materials and structures, ecological buildings, management, information, organization, computer and decision-making systems for building companies, techniques and testing of building materials and products.

PROJECT IDEA/POSITION (TOPIC, SCIENTIFIC REQUIREMENTS, DISCIPLINE):

I. Static and dynamic properties of soil-scrap tyre rubber mixtures used as vibration isolation

Tyres belong to one of the most problematic waste. Thanks to the European legislation, since 2000 their landfilling has been banned. Now 75% of the scrap tyres have to be recovered and 15% recycled, making room for innovative and sustainable applications. The research on the use of this material started in 1990s in USA and is developing very fast worldwide, especially in America, Asia and Australia. Europe is unfortunately lagging behind.

The goal of the project is to develop an effective way to utilize scrap tyre rubber to damp vibrations generated in paraseismic events, typical for Silesia region of Poland, and by geotechnical works – like pile driving or deep compaction. The idea will be examined in four stages:

- small scale laboratory tests – oedometric and triaxial stress-path tests to determine evolution of stiffness and damping with strain; permeability and compaction tests;
- large scale laboratory tests – dynamic tests in calibration chamber;
- numerical tests based on the results of the laboratory tests (using Z_Soil.PC software);
- field tests – i.e. execution of a vertical barrier in the ground in the proximity of a vibrations' source.

All the experiments will be conducted on rubber alone and mixtures of rubber particles with different types of soil. The candidates are welcome to submit their proposals to participate in at least one of the mentioned stages of the research.

II. Theoretical and experimental analysis of the durability of reinforced concrete

The main objective of the proposed project is theoretical and experimental analysis of the durability of reinforced concrete. It will be tested with reference to corrosion risk development of rebars caused by the presence of chloride ions which are the strongest depolarisers. As the corrosion progresses, the increasing volume of reaction products causes cracking and loosening of concrete cover. It is very important to assess corrosion rate in existing concrete structures to apply the correct protection technique for buildings. Rebars of concrete structures are often diagnosed by means of corrosion potential testing and advanced electrochemical techniques which include linear polarisation resistance (LPR) and electrochemical impedance spectroscopy (EIS). When corrosion risk is determined, a decision on concrete rehabilitation should be made. Since 1987, a few countries have been using electrochemical extraction

method. This method is based on cathodic polarisation in the outer electric field. Classic description of ions transfer in the electrolyte solution does not reflect the real conditions. Similarly, Fick's diffusion equations considerably simplify the problem. However, these types of equations are used to model migration of ions in the cover under the influence of electric field during chloride extraction (ECE). The main innovation of this project is creating the theoretical model of chloride extraction according to thermo-mechanical equations of multi-component medium, which characterizes the cover properties.

Experimental tests are carried out according to thermal and mechanical model of chloride extraction. Before proceeding rehabilitation of reinforced concrete elements, they will be exposed to the factor causing corrosion risk in two ways. The first method is based on alternate wetting of elements in NaCl solution and drying in the climatic chamber KPK 600 with a system of cyclic immersion test element at stable temperature and relative humidity. The second one consists in exposing samples to the electric field to accelerate ingress of aggressive chloride ions.

LPR and EIS polarisation tests will be made by Gamry instrument. This instrument consists of of Gamry Framework Software (with DC 105 applications for direct current tests and with EIS application for alternating current tests).After completing the tests, the concentration profiles of chlorides in concrete pore solution will be determined by grinding concrete layers with Profile Grinding Kit. Concrete pore solution will be obtained in a pressure flask by means of vacuum extraction method in the separated solution. Concentration of solutions leached from grinded concrete will be made in a vacuum evaporator RVO 400. pH will be determined in solutions with the stationary pH-meter: MP230 of Mettler Toledo company. Chloride concentrations in model concrete pore solutions will be measured with the multifunctional multimeter CX-701 Elmetron by means of ion-selective electrode.

Then, based on the density distribution of basic weight of liquid components under the influence of electric field, we can determine concrete reliable coefficient migration of chloride ions. This coefficient will be used in the numerical model to determine time, after which chloride ion concentration at steel surface reaches a critical value causing the risk of corrosion, using Athena Scientic - Červenka Consulting software. It is very important to determine precisely the development of corrosion in reinforced concrete structure before and after using the repair method. The other innovation of this project is to measure corrosion using simultaneously LPR and EIS techniques compiled with tests on migration of chloride ions during the extraction.

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www.polsl.pl/en/Pages/RB.aspx

III. FACULTY OF CHEMISTRY

SHORT DESCRIPTION:

The Faculty of Chemistry employs 13 professors, 19 associate professors, 66 assistant professors and 70 PhD students. According to the results of comprehensive evaluation of education and research activity performed by Polish Ministry of Science and Higher Education, the Faculty of Chemistry belongs to higher scientific category A. Faculty's scientific achievements of last year include 150 publications indexed by *JCR*, 10 patents and participation in 30 research projects financed from governmental sources and UE in the frame of Horozont2020 program. About 100 graduate and 15 PhD students finish the study on the Faculty of Chemistry per annum.

KEY RESEARCH AREAS:

The research areas are parallel to structure of the Faculty of Chemistry consists of five departments:

a) Department of Inorganic, Analytical Chemistry and Electrochemistry

The department covers vast field of chemical research, including electrochemistry, analytical chemistry, membrane processes and explosive materials.

b) Department of Organic Chemistry, Bioorganic Chemistry and Biotechnology

The main field of investigation are new synthesis methods of bioactive compounds like phosphoroorganics, five- and six-membered nitrogen-bearing heterocyclic compounds. Synthesis of complexing compounds as MRI contrast agents. Design and synthesis of new carbohydrate- and nucleoside-based compounds for potential biological activity against pathogens (cancer cells, bacteria, fungi) and enzymes involved in metabolism. Synthesis of monomers for optoelectronics and carbon nanostructures for application in drug delivery systems.

c) Department of Chemical Engineering and Process Design

The main field of study are nanoporous materials, multichannel microreactors, enzyme immobilization and nanoparticles, process design and chemical apparatus construction, separation processes, suspension hydrodynamics and nanofluidics.

d) Department of Physical Chemistry and Technology of Polymers

The main field of study: synthesis of functional polymers and polymers for special applications, characterization of macromolecular compounds, application of polymer materials in controlled drug delivery systems, application of spectroelectrochemical techniques for in situ studies of electrode processes, organic electronics and optoelectronics, analysis of transport processes in ion channels of living cells, transport through membranes and separation processes.

e) Department of Chemical Organic Technology and Petrochemistry

The main field of study: catalytic and non-catalytic oxidation of organic compounds, synthesis and applications of organic peroxy compounds, synthesis and applications of ionic liquids as alternative solvents or catalysts in organic synthesis, the use of organocatalysis in organic synthesis, fine chemical synthesis, asymmetric synthesis.

Faculty of Chemistry is well suited with research laboratories having all necessary equipment for identification and characterization of chemical structure and properties. NMR spectrometers (300, 400 and 600 MHz), FTIR, MS-spectrometer and special instruments for particular usage are available.

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www.polsl.pl/en/Pages/RCh.aspx

IV. FACULTY OF MECHANICAL ENGINEERING

SHORT DESCRIPTION:

The Faculty of Mechanical Engineering consists of eight institutes and departments, further divided into divisions:

- Institute of Engineering Materials and Biomaterials,
- Institute of Technological Processes, Automation and Integrated Manufacturing Systems,
- Institute of Theoretical and Applied Mechanics,
- Institute of Mechanics and Computational Engineering,
- Department of Welding,
- Institute of Fundamentals of Machinery Design,
- Department of Machine Technology,
- Department of Foundry Engineering.

KEY RESEARCH AREAS:

The MSCA IF project might be carried out in the following research areas (*not limited*):

Materials Science:

- modelling and simulating materials phenomena and properties of materials in the application to the development of the materials design,
- surface engineering,
- nanomaterials including amorphous and nanocrystalline materials,
- technologies of materials processes,
- biomaterials,
- lightweight materials,
- polymers and composite materials
- joining technologies i.e. welding, brazing, soldering etc.,
- foundry engineering, metallurgy and metalforming,

Mechanics:

- solid mechanics and mechanics of continuum,
- thermomechanics,
- parallel computing in mechanics,
- biomechanics,
- multiscale modelling,
- inverse problems,
- optimization of systems and processes,
- sensitivity analysis and methods of topology and shape optimization,
- identification of internal defects,
- numerical modelling of systems in stochastic and fuzzy uncertain conditions,
- computer methods in static and dynamic fracture mechanics,
- modelling of heat and mass diffusion,
- moving boundary problems,
- thermodynamics of foundry processes,
- computer simulation of technological processes,
- biomechanical models of bone and muscle systems,
- modelling of heat and mass transfer in biomechanics.

Machine operation:

- mechatronics,
- automation and robotics, including technological processes and technical systems,
- control of processes and systems using PLC,

- industrial networks, their implementation and testing,
- "motion control" techniques,
- use of artificial intelligence methods in control and automatic control,
- design and construction of mechanical and mechatronic systems,
- computer aided design, engineering and manufacturing,
- application of the finite element method,
- virtual reality methods and techniques in design and manufacture of machine elements,
- utilization of artificial intelligence methods for aiding the design, construction and manufacture processes,
- diagnostics of machines and technological processes,
- support systems for design and construction of machines,
- development of vision and thermal imagining systems,
- design and modelling of lightweight structures,
- design of machine tool mechanical components, elements and devices related to machine tools,
- modelling and experimental studies of machining processes,
- diagnostics of machines and devices using the latest findings in the field of metrology and artificial intelligence,
- modular systems for design and technology,
- designing specialized technological tools for manipulation robots,
- adaptive robot programming using movement synchronization algorithms in technological, multi-robot systems,
- industrial automation systems based on logic controllers (PLC) and SCADA applications,
- implementing solutions for industrial automation systems,
- resources of programmable logic controllers.

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V. FACULTY OF ORGANIZATION AND MANAGEMENT

SHORT DESCRIPTION:

Faculty of Organization and Management is located in Zabrze and employs 150 academic teachers and educates 2500 students at 7 main courses: management, sociology, administration, production engineering, logistic, project management and business intelligence. There are 4 internal units at the Faculty:

- Institute of Economics and Computer Science,
- Department of Applied Social Sciences,
- Institute of Production Engineering and
- Institute of Management Sciences, Administration and Logistics.

Each of these units conducts research within their own academic disciplines which respectively are: economics, computer sciences, sociology, production engineering. management, administration and logistic. The diversity of research allows to implement of interdisciplinary projects that are in demand in modern industry and contemporary economy. It also creates possibilities of multidisciplinary expert consultations.

KEY RESEARCH AREAS:

Our scientific interests and research fields focus on:

- strategic and process management, business models and their implementation,
- economic cooperation, market competition,
- human resources management,
- Corporate Social Responsibility, Sustainable Development and ethical aspects of organizations' functioning, including anti-corruption practices,
- industrial economics and corporate finances, especially: risk and value management, customer relationship management and efficiency optimizing,
- finance and management in public sector,
- financial markets and business analysis,
- contemporary problems of economy,
- methods and models in statistics and econometrics,
- tourism, especially post-industrial tourism,
- technical systems in industrial enterprises,
- quality management and process management,
- production engineering including: ergonomics, acoustics, logistics, waste management and reclamation of post-industrial regions.

We are open for new challenges and willing to cooperate in international scale. We offer the professional staff and knowledge as well as the experience in mentioned above areas.

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LET'S TALK ABOUT THE MSCA IF APPLICATION PROCEDURE

WHO CAN APPLY?

This action is meant to support the **best, most promising individual researchers** from anywhere in the world.

Only **experienced researchers** can apply. This means you will have your doctoral degree or at least four years full-time research experience by the time of the call deadline.

WHAT CAN BE FUNDED?

All research areas can be funded except those covered by the EURATOM Treaty as referred to in article 4 and Annex I. **Mobility across borders** is a must. Cross-sectoral mobility is also encouraged.

WHAT DOES THE FUNDING COVER?

The grant provides an **allowance to cover your living, mobility and family costs**. The grant is awarded to your host organisation, usually a university, research centre or a company in Europe. The research costs and overheads of the host organisation(s) are also supported.

European Fellowships last from **12 to 24 months.** Global Fellowships are composed of an outgoing phase during which the researcher undertakes a secondment to a partner organisation in a Third Country between 12 and 24 months, and a mandatory 12-month return period to a host organisation (the beneficiary) located in a Member State or Associated Country.

HOW DO I APPLY?

You submit a **research proposal**, including your CV. The proposal is **written jointly with your chosen host organisation**(s) (a university, a research centre or a company). Proposals are submitted in reply to a **call for proposals** published here **http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/msca-if-2017.html.**

JOIN US!

BUT FIRST, CONTACT ONE OF OUR CONTACT PERSONS MENTIONED IN THIS LEAFLET ☺