

## PROJECT PARTNER SEARCH FORM

☒ I offer my expertise to participate as a Partner in a Horizon Europe Project

☐ I am planning to coordinate a project and I am looking for Project Partners

### TOPICS OF INTEREST

TOPIC ID: HORIZON-CL4-2024-DIGITAL-EMERGING-01-31: [Pilot line\(s\) for 2D materials-based devices \(RIA\)](#)

TOPIC ID: HORIZON-CL4-2024-DIGITAL-EMERGING-01-54: [Smart photonics for joint communication & sensing and access everywhere \(Photonics Partnership\) \(RIA\)](#)

TOPIC ID: HORIZON-CL4-2024-DIGITAL-EMERGING-01-55: [Photonics Innovation Factory for Europe \(Photonics Partnership\) \(IA\)](#)

### PARTNER INFORMATION

Our group is centred on the Laboratory of laser microtechnology which is focused on the use of laser radiation as a technological tool in materials processing. The Laboratory of laser microtechnology is a department in International Laser Centre of SCSTI (ILC-SCSTI) which is a research organisation focusing on fundamental and applied research in the field of laser technology.

Along with the traditional technologies (surface marking, microwelding, material cutting ...), the laboratory is equipped with a system for pulsed laser deposition (PLD) of thin films. We have several years experience in the preparation of compact or nanostructured layers using PLD. Among them oxide materials (ZnO, TiO<sub>2</sub>, MgO, BaTiO<sub>3</sub>) were the most frequently studied.

Moreover, the laboratory and ILC is equipped large scale of analytical tools for characterization of deposited films (Hall system for electrical properties analysis of thin films by the four-point Van der Pauw method, scanning electron microscope LEO 1550, Secondary Ion Mass Spectrometry Ion-TOFSIMS IV, AFM / STM microscopy, Layer stress state analysis)

For the purpose of the project proposal within the topic identified above, we can offer preparation of thin films based on different materials by using of pulsed laser deposition. Along with the application of traditional technique of PLD (deposition at room temperature and on heated substrates, we are able preparing of amorphous films as a result of deposition on cooled substrates.

An important advantage of PLD compared to related deposition methods is the relatively simple principle and high versatility with respect to experimentally used materials. The method is not limited by the electrical, optical and thermo-physical properties of the materials and is suitable for both electrically conductive and dielectric materials, as well as materials with low or high melting temperatures.

Moreover, our deposition system is equipped with a specially designed sample holder which allows the substrate to be cooled by liquid nitrogen to the level of 77 K (boiling point of liquid nitrogen at atmospheric pressure). Such design results in a sharp temperature gradient, which effectively suppresses the crystallization of the growing layer and enables producing amorphous films with new properties in comparison with their crystalline counterparts.

### **Description of the Legal Entity**

The Laboratory of laser microtechnology is a department in International Laser Centre of SCSTI (ILC-SCSTI) which is a research organisation focusing on fundamental and applied research in the field of laser technology. The ILC-SCSTI a subsidiary organization (public body) of the Ministry of Education, Science, Research and Sport of the Slovak Republic.

The ILC-SCSTI research infrastructure has been built over a long period of time with the aim of preparing and characterising materials for optoelectronic applications in the form of thin films and complex nanostructures. In terms of the project's objectives, the core of the proposal are the facilities for the growth of thin films by pulsed laser deposition (it is important to mention its facilities for the growth of thin films by pulsed laser deposition). Their subsequent characterisation by various analytical techniques and eventual processing into the form of the resulting optoelectronic devices are also possible on site. The in house possibilities are also contains the UV photolithography technique patterning and techniques (etching, coatings) for processing the the stage of final device (diode, transistor demonstrating prototypes).

The ILC-SCSTI has long-standing successful collaborations with related research institutions and experience in EU scientific projects. Here is a list of the projects funded by the EU under its framework programmes with participating by International Laser Centre:

- *OPTIMAL (Automated Maskless Laser Lithography Platform for First Time Right Mixed Scale Patterning, <https://cordis.europa.eu/project/id/101057029>)*
- *LASERLAB-EUROPE (The Integrated Initiative of European Laser Research Infrastructures, <https://cordis.europa.eu/project/id/871124>)*
- *ESTABLIS, Marie Curie (Ensuring STABiLity in organic Solar cells, <https://cordis.europa.eu/project/id/290022>)*
- *N2T2 (Novel Nano-Template Technology And Its Applications To The Fabrication Of Novel Photonic Devices, <https://cordis.europa.eu/project/id/17481>)*
- *MORGaN (Materials for Robust Gallium Nitride, <https://cordisropa.eu/project/id/214610>)*

<input type="checkbox"/> Higher Education	<input checked="" type="checkbox"/> Research Institution	<input checked="" type="checkbox"/> Public Administration
<input type="checkbox"/> Industry /SME	<input type="checkbox"/> NGO	<input type="checkbox"/> Other: <b>Please specify</b>

### **Description of the (Research) Team**

#### **Ing. Andrej Vincze, PhD.**

He received the MSc. and PhD. degree in Electrical Engineering from Slovak University of Technology in Bratislava, in 1999 and the PhD in Electronics in 2006. Up to date, more than 100 works indexed in Scopus/WOS with over 350 citations (h = 13, SCOPUS, Scopus Author ID: 8905159800, ORCID 0000-0003-0242-4648). Working as an expert in SIMS analysis (surface and depth chemical analysis of thin films, depth profiling and surface mapping). He will be responsible for material analysis of structures on various material basis as feedback for the technology, surface mapping and depth profiling of thin films by the SIMS method. He participated in above mentioned projects funded by the EU; namely in ESTABLIS and N2T2 as a member of the research group.

**Ing. Miroslav Michalka**

He finished MSc. degree study Electrical Engineering from Slovak University of Technology in Bratislava. Within the scope of his expertise, he is involved in research on applications metal coating, microscopy and growth of thin films by pulsed laser deposition. The research focus also includes the analysis of materials by electron microscopy and the development of methods for monitoring technological processes using laser radiation. He has published several publications in this field. (ID Scopus: 6602302255, h=13; ID ORCID: 0000-0002-1499-1859). His task will be the surface analysis by SEM and growth of the hybrid ZnO/AlIIBV heterostructures by using of Pulsed laser deposition will be his main task in the proposed project. He participated in above mentioned projects funded by the EU; namely in N2T2 as a member of the research group.

**Ing. Jozef Chovan, PhD.**

He received the MSc. and PhD. degree in Electrical Engineering from Slovak University of Technology in Bratislava, in 1999 and 2003, respectively. He works as a Head of Information Technology Laboratory, where he has a responsibility for the research in optical communication systems, semiconductor optoelectronics devices, all-optical signal processing, silicon photonics and photonics sensing. He has authored over 60 papers and presentations in international journals and conferences. His role in the potential project will be the modelling of the components for the integrated photonic systems based on III-V/ Si/SiO<sub>2</sub> platform or others. He participated in above mentioned projects funded by the EU; namely in N2T2 as a member of the research group.

**Ing. Daniel Haško, PhD.**

He finished the MSc. and PhD. degree study at the Faculty of Electrical Engineering and Information Technology (FEEIT) of the Slovak University of Technology (STU) in Bratislava. In the past, he was the member of research teams of different national and international projects, within the frame of Marie Curie Action. Up to date, 45 works indexed in Scopus/WOS with over 400 citations (h = 10, SCOPUS, Scopus Author ID: 56262717700, ORCID 0000-0003-4254-0817). Working as an expert in surface and material analysis by scanning probe microscopy (SPM) and 3D optical microscopy (3D OM) techniques he will be responsible for surfaces analysis of structures and devices on various material basis as feedback for the technology and mapping of thin films surfaces by the SPM and 3D OM methods. He participated in above mentioned projects funded by the EU; namely in ESTABLIS and N2T2 as member of the research group.

**Ing. Daniel Figura**

He finished the MSc. degree in microelectronics at the Faculty of Electrical Engineering and Information Technology (FEEIT) of the Slovak University of Technology (STU) in Bratislava. He has several years experience in working in international groups for basic and applied commercial research. His role will be focused on design and optimization of UV lithography technological processes for preparation of optoelectronic devices. He has been participating in the EU funded project OPTIMAL as a member of the research group.

**Expertise of the Team Leader**

**Ing. Jaroslav Bruncko, PhD.** (Researcher). He finished MSc. and PhD. degree study at the Faculty of Materials Science and Technology in Trnava (MST) of the Slovak University of Technology in Bratislava (STU) in the study programme "Manufacturing Engineering". Within the scope of his expertise, he is involved in research on applications of laser radiation interaction with materials, development of new types of materials and technological processes, growth of thin films by pulsed laser deposition. The research focus also includes the

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analysis of materials by electron microscopy and the development of methods for monitoring technological processes using laser radiation. He has published several publications in this field. (ID Scopus: 6507012790, h=10; ID ORCID: 0000-0001-5363-7468).

Currently he works in International Laser Centre as a head of the Laboratory of laser microtechnology and he has experience as a project coordinator in several research projects funded by Slovak grant agencies.

#### **Potential role in the project**

☒ Research

☐ Training

☐ Dissemination

☐ Other: *Please specify*

Already experience as a	Coordinator	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	Partner	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
	Expert Evaluator	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
<b>CONTACT DETAILS</b>			

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