The first investment seeds of the European Commission are growing strong roots at the Institute of Solid State Physics, University of Latvia

The ISSP UL – a place for rising skills and starting innovation

IN 2018, the Institute of Solid State Physics at the University of Latvia (ISSP UL) celebrates its 40th anniversary. Established for education and science, during these 40 years ISSP UL has become one of the leading research institutions in Latvia, especially within the fields of material sciences, nanotechnology and photonics.

The ISSP UL road to excellence has been long and winding, and it has several important milestones marking achievements and turning points. In 2016, a project proposal entitled 'The Excellence Centre of Advanced Material Research and Technology Transfer – CAMART²' won the stage two competition of the European Commission's Horizon 2020 WIDESPREAD 1-2014: Teaming call.

Having received European Commission funding as well as the support of the Government of Latvia's Ministry of Education and Science and Ministry of Finance has provided the ISSP UL with the opportunity to:

- Enhance our capabilities in research by networking, collaboration and partnerships;

The consortium of the EU H2020-funded project CAMART² unites ISSP UL, KTH and RISE

- Upgrade and replenish our scientific infrastructure;
- Develop Master's and Doctoral programme by offering modern and attractive courses for Latvian and international students;
- Develop a platform that makes our scientific expertise beneficial to businesses; and
- Learn from our advanced Swedish partners Royal Institute of Technology (KTH) and Research Institutes of Sweden (RISE).

One of these is the creation of the Riga-Stockholm Collaboration and Technology Transfer Platform (RIX-STO) for applied materials physics research and innovation related to high-tech developments and corresponding industries in the region.

Together with the consortium partners – KTH and RISE – the joint collaboration platform RIX-STO will be focused on the promotion of new products and start-up enterprises through enhanced interactions between students, scientists, and entrepreneurs, and in combination with outreach activities, it is hoped that academia and high-tech industries in the region around Riga and Stockholm will flourish with respect to scientific results, economic growth and increased competiveness. The region will benefit from the addition of highly educated young people and closer collaboration between academia and industry for applied materials physics on both sides of the Baltic.

RIX-STO activities will also strengthen usage of the Open Access Laboratory (OAL) infrastructure at ISSP UL, where, within the CAMART² consortium, infrastructure development will be synchronised so that expensive tools and specific competences are established at one site and utilised by all through open access agreements.

The OAL organisation will rely on the extensive experience from KTH's Electrum Lab, including routines for lab operations, choices of tools, and a model for co-operation with industry and scientific organisations for fulfilling the requirements for science, innovations and technology transfer. In this way, the OAL developed in the RIX-STO platform will support the scientific and innovative activities by concentrating competencies and infrastructure in an efficient and service-oriented way and will provide access to a very dynamic environment with rich networking activities not only for research institutions but also for third-party customers.

Here, a challenging task for the ISSP UL is not just to increase its infrastructure capabilities and number of employees, but to create and maintain the environment and the culture within the institute that stimulates the formation of well-functioning, passionate, world-class scientific teams which will ensure long term sustainability.

Education

Sustainability is highly dependent on the next generation, who will go on to take the mantle of scientific fervour and maintain it in unremitting research and continuous development. Although the ISSP UL does not issue education diplomas, since its foundation it has been actively engaged in teaching at the bachelor, master's and doctoral levels, with close links to scientific work at the institute.

A great share of the diploma works defended at the University of Latvia is carried out here, and a number of scientists at the ISSP UL are involved in the teaching and administration of the bachelor and master's programmes in physics. This engagement is of vital importance for the recruitment of students and young scientists to the ISSP UL. Education is identified as a key for development for the regional high-tech industry through the provision of well-educated, competent and skilled scientists, engineers, and entrepreneurs.

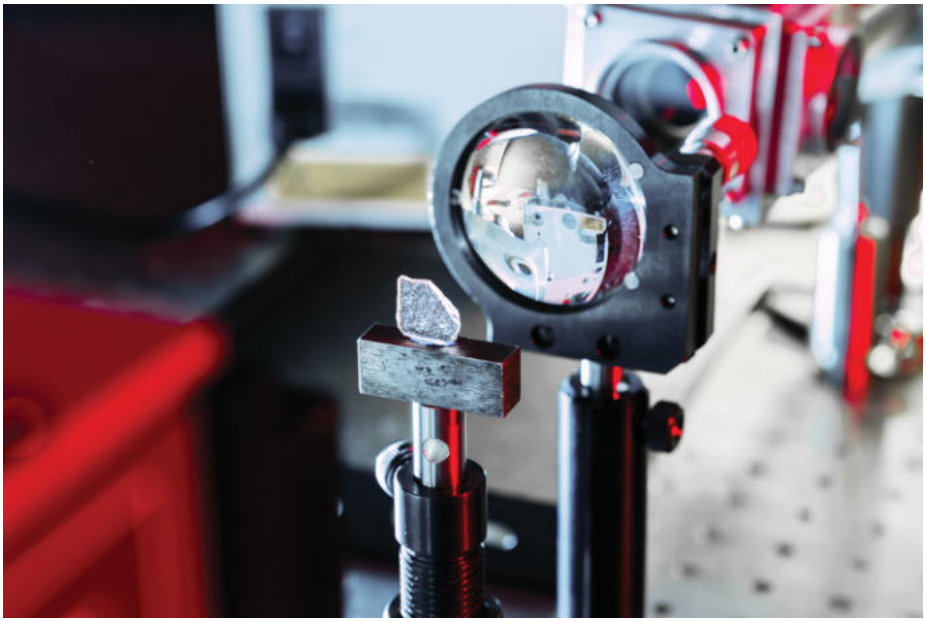
Full elaborated course list:

- Materials physics and applications;
- Nanomaterials and nanotechnology;
- Solid state physics;
- Semiconductor physics and devices;
- Computational methods on materials research;
- Symmetry, crystallography, group theory;
- Microscopy and spectroscopy characterisation methods;
- Optical and magnetic spectroscopy;
- Electrical characterisation of materials;
- Micro and nanofabrication of electronic and photonic devices;
- Thin films and coatings;
- Synthesis, processing and applications of modern materials;
- Entrepreneurship skills development; and
- Scientific methodology.

To enhance the throughput of students, a thorough upgrade of the existing master's programme is undertaken in close collaboration with the University of Latvia and KTH researchers and professors thanks to CAMART^2. The objectives of the programme modifications are elaborated to achieve scientific excellence of strategic relevance for ISSP UL and projected industrial needs. Hence, the compulsory part of the programme will be modern, general, and comprehensive in order to attract students with different backgrounds in physics and with a broad interest range from science to development and innovation.

Optional courses are in line with the research priority directions of the ISSP UL, comprising topics on materials science, nanotechnology, micro and nanoelectronics, thin films and photonics. In addition, for courses related to the development of entrepreneurship and innovation, skills are given a prominent role in the new master's programme.

Furthermore, a doctoral studies programme will be developed in a similar manner, involving professors from KTH and ISSP UL scientists. Additionally, PhD students will visit for hands-on experience at KTH and Acreo in the frames of CAMART^2 and other possible instruments (e.g. VISBY, ERASMUS). The doctoral programme will be open to international students, implying that courses may also be taught in English.



materize

A new platform for collaboration with industry to make science expertise beneficial to business

Materize – platform for collaboration with industry

The ISSP UL has set the objective to improve and develop co-operation with the industry in Latvia and abroad. When assessing different co-operation models, the conclusion was that it is necessary to establish a single point of contact that would provide both access to the expertise and resources of the ISSP UL, as well as communication with companies in the language of business, and the implementation of projects in accordance with industry standards. To achieve this collaboration between science and industry, we have created a special platform – Materize.

Materize will ensure the clear positioning of science expertise in the international business environment by direct communication in the industry's language and by implementing projects in a manner beneficial to business. Within the framework of Materize, business-customer-tailored processes, clear information for the industry, and a simple approach to our competences and infrastructure have been created with the aim of making scientific achievements and services valuable for business. Materize is representing the expertise of the ISSP UL in collaboration with its partners from regional industry and international science institutions.

Materize is providing services in following areas:

- Smart materials in electronics, photonics and sensor applications;
- Materials for energy production and storage;
- Thin film and coating technology;
- Modern methods of material characterisation;
- Theoretical modelling of materials;
- Development of demonstrators and prototypes; and
- Innovation development.

At present, the institute already has already gained experience in co-operation with international market players in high-technology areas, such as GroGlass, Sidrabe, MassPortal, Baltic3D, LightGuideOptics International, EuroLCDs, CeramOptec, RD Alfa Microelectronics and others. These include such fields as anti-reflective glass, scientific and vacuum coating devices, 3D printing/additive manufacturing, fibre optics for high power applications, liquid crystal and 3D displays, and radiation resistive microelectronics.

It is planned that Materize will directly increase the export of the ISSP UL's science services and attract investment for the creation of new innovative companies in Latvia.

Deep Science Hackathon

Materize's first public event was Deep Science Hackathon 2018, the first material science based hackathon in Latvia.

"History shows that Latvia has always been a centre for high technologies. I believe that we have all the necessary preconditions to make Latvia such a centre again. The goal of the ISSP UL is to develop technologies using innovative materials, which help in the creation of new products in the industry of high technologies. Thus, through the development of Materize as an efficient co-operation platform, we are able to make the scientific excellence efficient and beneficial for the industry," says Andris Anspoks, Deputy Director for Innovation of the ISSP UL.

The first step in the direction 'science for business', the Deep Science Hackathon was a 48 hour event organized by the ISSP UL and S/B PRO Startup Studija. A goal of the event was to identify high technology ideas and to find teams for the implementation and creation of new products and companies with significant contributions to the Baltic high technology industry, and which can result in outstanding achievements for Latvia, as well as provide significant contribution to the domestic and regional economy.

Hackathon participants had to establish inter-disciplinary teams with previously submitted ideas, and to develop these ideas together with mentors before presenting a commercialisation plan in front of jury consisting of scientists, investors and interested persons at the end of the event.

The best ideas can continue to be developed at the ISSP UL in co-operation with the Swedish partners KTH and RISE, Polish partners InnoEnergyas as well as S/B PRO Startup Studija within a six-month support programme including the support of mentors, the creation of a prototype, and the attraction of further funding. Mentors from RISE and KTH Innovations noted the high quality and depth of the presented ideas.

During these 48 hours, the winning team, with the symbolic name 'Vitamin D', perfected their idea for a non-invasive method of measuring the level of vitamin D in the human organism. The jury positively evaluated this idea because of its great business potential.

Alongside the winners, the hackathon participants presented ideas such as the possibility to determine the quality of a material with the help of sound, a fencing vest with touch-built-in sensitive sensors to determine results, a solution for the early screening of skin cancer, an idea for a 3D projection, augmented reality glasses, waste-processing facilities for tyres, and others. A total of 12 ideas were presented for the Deep Science Hackathon, of which eight successfully reached the final phase of the activity.

Dr Andris Anspoks, Deputy Director for Innovation of the ISSP UL

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