



NATIONAL INSTITUTE OF CHEMISTRY

OUR KNOWLEDGE IS YOUR  
OPPORTUNITY



WE CREATE NEW KNOWLEDGE AND SOLVE SOCIETAL CHALLENGES

HEALTH

HIGHLY QUALIFIED PEOPLE

ENVIRONMENTAL PROTECTION

FOOD SAFETY

CIRCULAR ECONOMY

CLIMATE CHANGE

SUSTAINABLE ENERGY

EXCELLENCE  
SHARING KNOWLEDGE  
COURAGE  
COLLABORATION  
NO LIMITS  
FAMILY

WITH THE EXCELLENT RESEARCH BEING DONE AT THE NATIONAL INSTITUTE OF CHEMISTRY, WE ARE PUSHING SCIENTIFIC BOUNDARIES, CREATING TRENDS IN FUTURE INDUSTRIES, AND TRANSFERRING KNOWLEDGE TO YOUNGER GENERATIONS.

In 2018, we remain proud holders of various certificates. Family Friendly Enterprise and Global Impact reflect our social responsibility, and certificates of quality ISO 9001, ISO 17025 and GMP.



GLOBAL IMPACT





NATIONAL INSTITUTE OF CHEMISTRY

## EXCELLENCE.

Discovering the unknown with outstanding equipment and knowledge.



“ We are aware that great breakthroughs are reached through many small steps – achievements accomplished with the help of the effort and curiosity of our excellent researchers. As the Institute’s Director, I strive to ensure that these efforts are supported and that the results are transferred to industry and contribute to the development of the local and international economy. Science is the key to the progress of humanity and should, as such, hold an adequately important place in our society. ”

*Prof. Dr. Gregor Anderlub,  
Director of the National Institute of Chemistry*

## Awards for scientific excellence, innovation and creativity in recent years

- Zois Awards and the Zois Certificates of Recognition for scientific excellence, 2017, 2018
- Pregl Awards for outstanding achievements in the field of chemistry and related disciplines 2015, 2016, 2017, 2018
- Two Golden Awards for innovation by Central Slovenia’s Chamber of Commerce and Industry, 2018
- Chancellor Award for best innovation, 2018
- Krka Award, 2017
- Falling Walls Lab for best innovative idea, 1st and 2nd prize, 2016
- ... and other earned designations.

## The first Slovenian research project in the field of life sciences and chemistry, financed by the European Research Council (ERC)

- Molecular machines based on coiled-coil protein origami, 2018  
Prof. Dr. Roman Jerala



## From 2015 to 4. 12. 2018 our original scientific work was published in the most prestigious scientific journals

- Science, 2 publications
- Nature Biotechnology, 1 publication
- Nature Chemical Biology, 1 publication
- Nature Communications, 6 publications
- Nature Materials, 2 publications
- Nature Medicine, 1 publication
- Nature Nanotechnology, 1 publication
- Journal of the American Chemical Society, 5 publications
- ACS Catalysis, 4 publications
- Advanced Energy Materials, 2 publications
- Accounts of Chemical Research, 2 publications
- ... and many other excellent publications.



Our scientific findings and breakthroughs, which are the result of the work of excellent scientists working with top-notch research infrastructure, generate innovations and promising technologies.

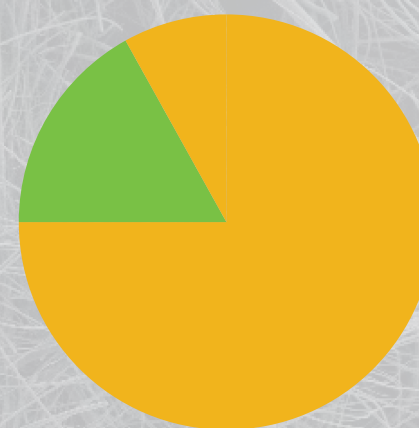
We offer these to industrial partners through different ways of collaboration:

LICENCING OR SALES OF PATENTS AND KNOW-HOW, WHICH ARE THE RESULT OF BREAKTHROUGH RESEARCH

CONSULTING; CONTRACT RESEARCH AND ANALYTIC SERVICES AND LONG-TERM R&D COLLABORATION

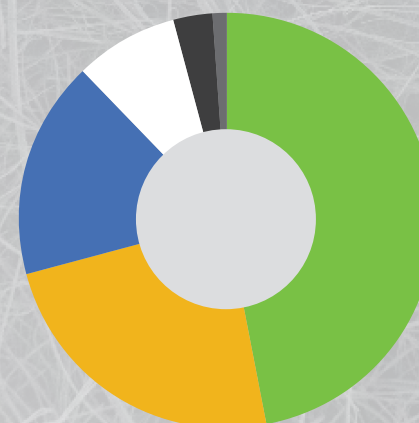
JOINT PARTICIPATION IN DOMESTIC AND INTERNATIONAL PROJECT CONSORTIA

## Income in 2017



- Public funds and income from EU projects 83%
- Income from collaboration with industry 17%

## 309 employees in 2017



- 47% Doctors of Science
- 24% Doctoral students
- 1% Masters of science
- 17% High level
- 3% Higher level
- 8% Others

## KNOWLEDGE TRANSFER – LICENCING AND SALES OF PATENTS AND KNOW-HOW

WE SHARE KNOWLEDGE.

We raise public awareness, spread knowledge among the young, and transfer it to industry.

The National Institute of Chemistry is one of Slovenia's leading public research institutes based on the number of filed international patents.

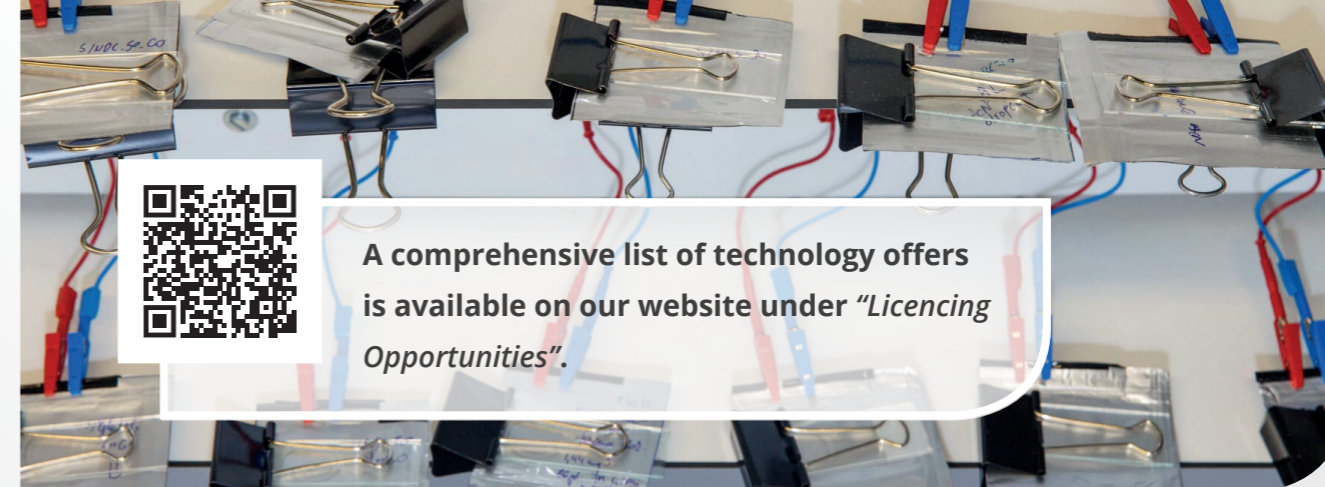
From 2008 to 2018, we filed patent applications at the five largest intellectual property offices (EPO, USA, Japan, Korea, China) for 24 innovations. In this period, we filed a total of 68 patent applications for innovations from the Institute.

The KTO actively participates in building longstanding relationships with our industrial partners – searching for clients for IP licencing and/or acquisition; searching for opportunities for consulting and R&D collaborations; and active marketing of the knowledge and expertise that the Institute offers to industrial partners.

The Knowledge Transfer Office (KTO) has three main roles:

- support researchers in recognising and protecting inventions with high commercial potential;
- commercialisation of knowledge from NIC;
- networking and co-creation of the local and international innovation ecosystem.

The water-soluble form of the Q10 coenzyme is our most successful patent, which created approximately €500,000 commercialisation revenue for the Institute.



### SELF-ASSEMBLED PROTEIN NANOSTRUCTURES

This invention enables the planning of new protein structures, which are not found in nature. This allows us to prepare completely novel advanced nanomaterials for medical purposes, sensors, and bio-catalysis. Prof. Dr. Roman Jerala has been awarded for this research a prestigious 5-year ERC project for established researchers in the total amount of 2.5 million euros, related to the field of synthetic biology. Granted European patent EP276401; US patent application US2016311859.



### NEW ACTIVE SUBSTANCES FOR COMBATING PLANT DISEASE

The inhibition of NLP proteins is an entirely new method of protecting economically significant plants. Inhibitors have been protected with an international patent application and the innovation was awarded the Chancellor Award for best innovation of 2018. European patent application EP3315028.

### ASH-FREE PELLETS FROM LOW-VALUE BIOMASS: THE BIAR PROCESS

The removal of inorganic ash from biomass enables the long-term durability of boilers for biomass, gasification, and other types of energy use from bio-based materials, e.g. wood. This technology ensures low-cost ash removal using methanol or similar alcoholic substances. The patent is a product of a long-term collaboration between the National Institute of Chemistry and the Italian company INSER Energia s.r.l. International patent application WO2017208268.

### ABOUT SPIN-OUTS

We are actively participating in the innovation ecosystem and we support our entrepreneurial researchers in the establishment of spin-out companies. These companies often operate in very niche areas and need to partner with larger companies / partners in order to reach larger markets. Due to their specific expertise, they offer the key to the innovative potential of larger companies, which can improve their products and services with added value.



SIGNING A LICENCING CONTRACT WITH THE SPIN-OUT COMPANY MYCOL, 2017.

### Why did you opt for an entrepreneurial path?

“The company was founded as a result of many years of successful research on smart materials that I conducted together with my young researchers. We had a vision that with our knowledge, experience, and potential, we could create products with high added value. To do that, we had to establish a company, find a marketing niche, create a suitable business model, and arrange the collaboration with the Institute. We hope that our start-up will grow to become a successful company, which will produce and market innovative products based on our unique knowledge.”

Assoc. Prof. Dr. Marta Klanjšek Gunde

# R&D COLLABORATION WITH COMPANIES AND CONSULTING

## COURAGE.

*We are curious, creative, and we dare.*

The Institute's collaboration with industrial partners leads to improved efficiency and added value for companies, as well as to the integration of the latest technologies and knowledge into new products. Furthermore, the development cooperation allows the industrial sector to hire services, equipment, and personnel that they are otherwise unable to develop or maintain due to a lack of capacities or assets.

**When collaborating with industry, we follow three basic principles:**

1.



The Institute protects the partners' trade secrets.

2.



We comply with internationally established ethical rules and standards.

3.



We have longstanding standard policies on intellectual protection and we successfully protect and use the knowledge and inventions that result from the process of collaboration.



## HONDA

The Power of Dreams

**An example of R&D collaboration with the international corporation Honda:**

The collaboration with Honda corporation is a long-term R&D project, which aims to develop a novel, sustainable commercial battery concept, which will be commercialised after 2025.

“ The work is based on basic research findings, which are the result of a team of 5-6 younger researchers, and have been published in the most prestigious scientific journals. The 5-year collaboration has also resulted in the establishment of mutual respect and trust, which is an excellent basis for further collaboration. ”

*Prof. Dr. Robert Dominko*



**The goal of NIC is building long-term strategic alliances with our industrial partners, through which we co-develop new technologies. The company's own R&D capacities are therefore enriched with the creativity and comprehensive knowledge of our researchers. At the same time, the company has an opportunity to use the top-notch research infrastructure, which is essential for new breakthroughs.**

**All the departments of the National Institute of Chemistry can participate in the R&D collaboration and offer counselling.**



Contact the Knowledge Transfer Office:

knowledge.transfer@ki.si  
Telephone: +386 1 4760 529



# CONTRACT AND ANALYTICAL SERVICES FOR INDUSTRY

## COLLABORATION.

Together we can solve the toughest challenges.

The Centre for Validation Technologies and Analytics (CVTA) is the starting point where we can successfully determine your needs for contract research.

At CVTA we routinely perform different GMP certified services, including force degradation studies, validation and transfer of analytical procedures and GMP analytics, qualitative and quantitative analytical testing of commercial products/goods with validated analytical procedures in GMP environment and issuing certificates of analysis and compliance.

We are also an entry point for establishing problem-solving services for industry. We approach these activities by forming project groups of NIC researchers with adequate knowledge and research infrastructure. This allows us to successfully solve various challenges facing our industrial partners.

### AREAS COVERED:

#### CHEMICAL ANALYSIS IN A GMP ENVIRONMENT:

- chromatography
- element analysis
- dissolution tests
- wet chemistry

BIOLOGICAL AND BIOCHEMICAL RESEARCH

MATERIALS

CHEMICAL TECHNOLOGY & ENGINEERING



Our work is also supported by computer simulations.

### Certificates:

We have certified GMP laboratories and expert knowledge in the GMP and GLP requirements

- \* GMP (standard of good manufacturing practice)
- \* GLP (standard of good laboratory practice)



(2012, 2014) 2017



(2009, 2013) 2015



(2009, 2013, 2015) 2018



### RESEARCH EQUIPMENT:

GC-FID/ TCD/ MS  
ICP-MS / ICP-OES  
HPLC, U(H)PLC, IC  
TLC  
Dissolution tests

NMR 300, 600 and 800, part of Slovenian NMR Centre



### COUNSELLING SERVICES AND SHORT-TERM DEVELOPMENT ACTIVITIES OFFERED BY ALL DEPARTMENTS

Our researchers are leading experts with plenty of in-depth knowledge and research creativity. Synergistic collaboration between all research departments and individuals allows them to solve the most difficult problems and offer you consulting in the fields covered by the National Institute of Chemistry.

Developers and providers of the equipment used by our researchers can, with our help:

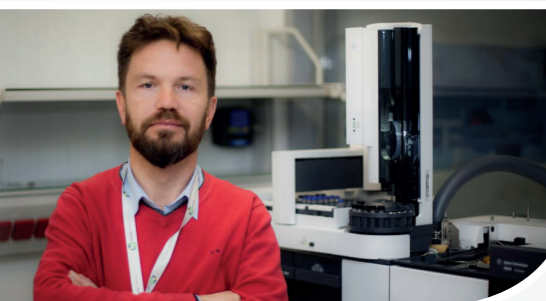
- test,
- validate,
- acquire references,
- and improve products.

We can help you approach the market from the point of view of users and technology.



The contact person for CVTA is the Head of the department, Dr. Samo Andrežšek

samo.andrensek@ki.si  
Telephone: +386 1 4760 474



Lek d.d.

“ Lek has been cooperating with the National Institute of Chemistry, specifically the CVTA, in the field of industrial research and intellectual property, the development/ optimization of analytical procedures, as well as their validation for many years. The CVTA plays a highly important role in establishing a link between Lek and other more research oriented departments of the National Institute of Chemistry, where together we introduce new techniques/technologies that are extremely important for the pharmaceutical industry. With their investments in professional competence and quality, the National Institute of Chemistry and CVTA enable long-term cooperation with the industry, which is an excellent example of partnership cooperation. ”

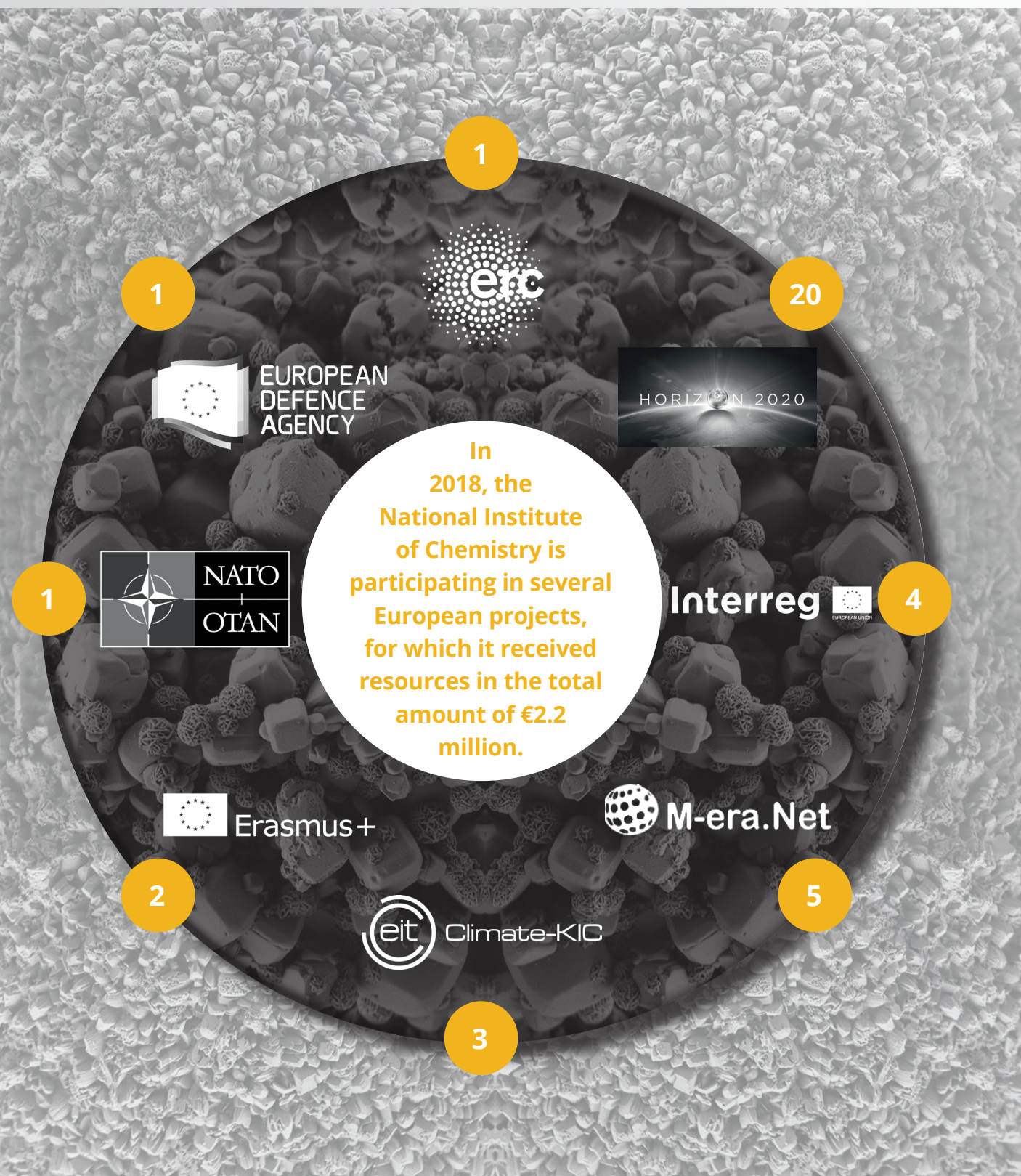
Dr. Bojan Mitrović,  
Head Analytical Development Sandoz  
Development Center Slovenia Lek d.d.

## COLLABORATION WITH INDUSTRY IN CONSORTIA FOR ACQUIRING EUROPEAN PROJECTS

NO LIMITS.

We are globally integrated and open to collaboration.

We ensure regular applications and competition in international project calls for tenders. Our partners from industry may use participation in such consortiums to upgrade their research abilities. The National Institute of Chemistry has been successfully acting as a scientific hub for several years. The Project Office offers help in establishing projects' financial and organisational structures, and works as the connecting link between partners.



## WHAT CAN CONSORTIUM PARTNERS GAIN?

- Improved knowledge and development of researchers for inclusion in global industrial trends.
- The integration of a larger number of younger staff, acquiring valuable experience and new R&D knowledge.

- Acquiring specific knowledge unique to the National Institute of Chemistry.
- Increasing the company's value with new intellectual property.

- Access to outstanding research equipment.
- Work in breakthrough scientific areas, which match EU priority areas.

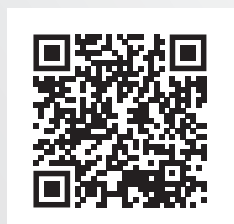
- Research excellence as a basis for achieving higher level of technological development, leading to a potential increase in profit.
- Creating a network of partners in research and industry.
- Support in planning and implementing projects.

### Melamin

Melamin d.d.  
Kočevje

“ The many years of cooperation between MELAMIN, d. d., Kočevje and NIC have proved to be successful. In this respect, it is of the utmost importance for the company to have quick access to state-of-the-art research equipment, with appropriate support of the knowledge and competencies of researchers at the Institute. The joint work on the projects enables many synergies in the exchange of ideas, which enables even faster development of innovative products and technologies. ”

*Dr. Igor Mihelič  
Technical Manager  
Melamin d.d. Kočevje*



Contact with the Project Management Office:



project.office@ki.si  
Telephone: +386 1 4760 498

## RAISING HIGHLY QUALIFIED RESEARCHERS IN OUR LABORATORIES

### FAMILY.

We trust and support each other.

**We place great emphasis on the potential of the young generations.** The connection with them is established as early as during their education, before they become our colleagues at the National Institute of Chemistry. Those who decide to join us later can aspire to a successful career in science or industry.

**In 2017, a fifth of the new doctoral students were supported with resources directly or indirectly arising from industry.**

Among the more recognisable support systems for young people are mentorships of students for participation in international competitions, such as iGEM, where they have the opportunity to work with established researchers as their mentors.

The National Institute of Chemistry supports its employees in mentoring the young at various levels of education.



1ST PLACE IN THE CATEGORY OF FOUNDATIONAL ADVANCE AT THE iGEM COMPETITION OF PROJECTS IN SYNTHETIC BIOLOGY, 2016.



Our researchers often receive renowned prizes, many of which are awarded or supported by industry such as Krka Awards. We are proud to work alongside recipients of awards for research excellence (Zois Awards and Prizes, Pregl Awards, IJS Golden Emblem Prize).



The 'Marie Skłodowska-Curie Actions' scholarship scheme supports collaboration between industry and the academic sphere, as well as various kinds of training for ensuring career development and employment opportunities for researchers.



In 2017 and 2018, National Institute of Chemistry's researchers, **Dr Maja Marušič, Dr Tina Lebar, and Dr Tea Lenarčič** received scholarships from the national programme arising from our L'Oréal-UNESCO partnership, which supports women in science.



**With the resources dedicated to the Janko Jamnik Fund, you can contribute to staff development**

Every year, we issue a tender toward resources from the Janko Jamnik Fund to support a selected young researcher.

The Fund aims to empower promising young researchers and scientists and to support the establishment of novel groups and projects in which young individuals play a key role. When young researchers transition to industry, they use their potential to enrich companies and benefit wider society.

**The 2018 scholarship was awarded to Vesna Štih from the Faculty of Chemistry and Chemical Technology of the University of Maribor.**

“ It is a pleasure and an honour to receive the Janko Jamnik doctoral scholarship. To start a career at such a renowned institute is both a privilege and a great responsibility. I look forward to working at the National Institute of Chemistry, as becoming a researcher has been a long-time dream of mine. ”



VESNA RECEIVED THE SCHOLARSHIP DURING THE THIRD NATIONAL INSTITUTE OF CHEMISTRY WEEK FROM THE HANDS OF PRESIDENT OF THE RS, MR. BORUT PAHOR.

Resources for the fund can be transferred to the bank account of the National Institute of Chemistry, Hajdrihova 19, Ljubljana, **number: 01100-6030344533, special reference: 0104.**



Contact the person in charge:



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Photos: The archive of the National Institute of Chemistry, Shutterstock

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REPUBLIC OF SLOVENIA  
MINISTRY OF EDUCATION,  
SCIENCE AND SPORT