



The National Centre
for Research and Development

**THE NATIONAL CENTRE FOR RESEARCH AND DEVELOPMENT.
INTERNATIONAL R&D COOPERATION
2007 – 2019**

Warsaw, 2019

INTERNATIONAL COOPERATION

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1 FOREWORD FROM THE DIRECTOR OF NCBR



PhD Eng. WOJCIECH KAMIENIECKI
Director of NCBR

I am delighted to present to you the publication, illustrating what NCBR has achieved in terms of international cooperation, which has been published on the occasion of the Conference titled *International Cooperation: A Powerful Mechanism To Enhance The Competitiveness of The Domestic Research Sector*. This is the first event of such significance to sum up NCBR's international activities spanning a period of over 12 years.

Since its inception in 2007, NCBR has bridged the worlds of science and business. I am deeply honoured to preside over it from April 2019. NCBR is the main funder of research, development and innovation in Poland. It is also the largest R&D funding agency in Central and Eastern Europe.

International cooperation is one of NCBR's most important statutory tasks. And we are proud of what Polish researchers and entrepreneurs have achieved with their foreign partners in NCBR-funded projects. You will find information about the most prominent international cooperation stories in this publication, I would like also to mention a few other equally interesting facts.

Over the past four years NCBR has annually opened 30 international calls for proposals with an average total budget to the tune of EUR 81.5 million. Many of these are in ERA-NET scheme which is an example of long-term international cooperation where many countries join forces to

tackle challenges in various research areas, from agriculture to transport.

Among international researchers working hand in hand with Polish partners under an NCBR grant was Professor Hiroshi Amano, a 2014 Nobel Laureate in Physics. The project was called WISEGaN and concerned new methods of quantum structure fabrication for blue optoelectronics.

NCBR's first bilateral cooperation programme was initiated with the State of Israel, thanks to the MoU signed in 2010 with Israel Industry Center for R&D (MATIMOP/ISERD). NCBR has developed international cooperation with partners from various countries and regions in next years, including: USA, China, Singapore, Turkey, Republic of South Africa.

For the second time in a row NCBR has also been appointed operator of the applied part of the EEA and Norway Grants. With more than EUR 74 million at disposal in the years 2012-2017, and further EUR 77.6 million in the present edition, NCBR will be able to develop research cooperation between business and academia in Poland and Norway.

These are but some examples of the fruitful international efforts NCBR has had the pleasure to support. I wish you all an interesting read and an enjoyable conference.

2. INTERNATIONAL COOPERATION AN OVERVIEW

International cooperation has been in The National Centre for Research and Development's (NCBR's) bloodstream since its inception in 2007. In accordance with Art. 30 Para. 1 point 4 of the Act of 30 April 2010 on the National Centre for Research and Development, one of NCBR's tasks is to participate in the implementation of international research and development programmes, including programmes co-financed from foreign funds.

The main goal of international cooperation conducted by NCBR is to increase the international competitiveness of Polish research teams by cooperating with foreign partners, gaining international experience, transferring know-how, and strengthening the international position of Poland. NCBR participates in the organisation of calls for proposals for international research or R&D projects and finances Polish entities (research units, enterprises, scientific consortia) implementing international projects through participation in numerous calls for proposals in the programmes: bilateral ones, more on which in a separate article, numerous ERA-NET initiatives, joint ventures and joint programmes (including Eurostars, AAL, JU ESCEL) as well as CORNET and EUREKA initiatives, to name just a few.

The year 2018 saw an intensification of NCBR's international activities, not least thanks to the creation of a dedicated Department of

International Cooperation. In 2018 NCBR launched 34 calls for proposals with a total allocation of over PLN 108 million. In 2018, NCBR signed 80 international agreements totalling PLN 76.6 million, with 25 calls for proposals settled. At that time NCBR monitored the implementation of 350 international projects. The involvement of entrepreneurs' own funds in R&D remained at a satisfactory level. The beneficiaries' own contribution to projects in 2018 amounted to more than PLN 8.6 million (according to the total contribution declared in newly signed contracts), which represented a 44% increase compared to 2017.

NCBR finds participation in partnerships beneficial as it allows to finance Polish entities participating in bi- and multilateral international R&D projects on issues of high transnational importance. Polish entities gain a number of benefits as a result, such as building international networks, exchanging knowledge and staff, gaining experience in managing and administering international projects. This would not be possible only through taking part in national calls for proposals.

Thanks to participation in international projects, NCBR welcomes the growing independence of Polish research teams, as well as the awareness and knowledge of administrative departments that manage projects from the formal and

financial side. Initially, knowledge of these programs was negligible, but over time the situation has significantly improved.

From the perspective of a financing agency, NCBR finds it important to implement cooperation with other institutions of similar profile, including those in countries with the highest innovation rate. We believe that participation in each programme allows NCBR to gain experience in the preparation and running of various types of calls for proposals. It also provides an opportunity to compare the procedures applied and select best practices. Contact with international experts helps generate a network of international links and facilitates establishing cooperation in the assessment of applications submitted to NCBR.

NCBR constantly extends its international programmes portfolio. In 2020 we plan to launch an acceleration programme for Polish companies implemented together with seasoned business experts from Nevada, US. The goal of the programme is to initiate the cooperation of companies and institutions from Poland and the State of Nevada in a broadly understood area of innovation, including commercialisation of excellent technological applications as well as facilitating cooperative methods of R&D activities.

We have recently kicked off with our Liaison Office in Brussels which shall become fully operational in the first half of 2020. Its main objective is to increase the share of Poland in absorbing finances allocated to EU research programmes from the present level of 1% to 3% by 2027. Over the coming 7 years and under the framework of Horizon Europe programme we want Polish research teams to be more involved in the implementation of EU projects. We also plan to mobilise national entities to take up the roles of leaders in selected projects and significantly increase the scale of participation in budgets of EU initiatives and R&D funding programmes.

3. NCBR INTERNATIONALLY IN NUMBERS

The increase in the intensity and importance of collaboration is one of the features that define modern science. The importance of networks is growing, while at the same time, disciplinary, institutional, sectoral or administrative boundaries are being exceeded. Among the major factors stimulating the growth of scientific collaboration are:

- The progress of science and growing specialisation. On the one hand, the development of science forces specialisation (it is challenging to be an expert outside the narrow fields), on the other hand, many important issues require interdisciplinarity—combining knowledge from different areas¹.
- Increasing pressure on the productivity of individual researchers and scientific institutions, usually measured by a simple indicator of the number of publications or patents (“publish-or-perish”). Teams of researchers, using economies of scale and division of labour, are able to “manufacture” more publications than a single researcher.

- Increasing transport accessibility. In particular, the development of air transport facilitates distant collaboration². As a result, in the years 1980–2009 the average distance between co-authors of scientific publications increased from 334 to 1553 km³.
- The development of information and communication technologies. Communication via the telephone networks⁴, and subsequently the Internet, facilitated collaboration and exchange of data without the need for physical travel⁵.
- Substantial costs for some categories of research (e.g. molecular physics, exploration of the space, genetics) exceed the financial capabilities of a single institution, and even entire countries⁶.
- Access to unique resources. In some cases, collaboration is forced by specific geographical conditions, e.g. perfect settings for astronomical observations in Chile⁷. Another example is clinical trials. Testing

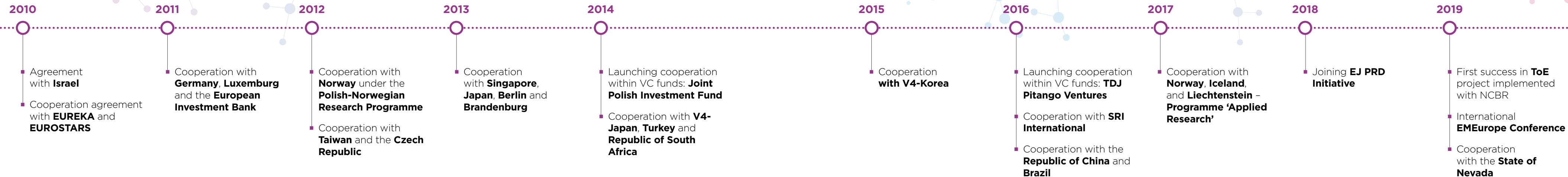
IN 2017 NCBR ANNOUNCED 28 INTERNATIONAL CALLS FOR PROPOSALS WITH A DEDICATED BUDGET OF PLN 65 MILLION.

medical procedures and new therapies requires access to a large number of patients who meet rigorously defined conditions—recruiting a suitable sample for testing very often requires covering a dozen or more countries.



¹ Hara, N., Solomon, P., Kim, S.-L., Sonnenwald, D. H. (2003). An emerging view of scientific collaboration: Scientists' perspectives on collaboration and factors that impact collaboration. *Journal of the American Society for Information Science and Technology*, 54(10), 952–965. DOI: <https://doi.org/10.1002/asi.10291>.
² Ploszaj, A., Yan, X., Borner, K. (2018). The impact of air transport availability on research collaboration: A case study of four universities. *Pobrane z:* <https://arxiv.org/abs/1811.02106>
³ Waltman, L., Tijssen, R. J.W., van Eck, N. J. (2011). Globalisation of science in kilometres. *Journal of Informetrics*, 5(4), 574–582. DOI: <https://doi.org/10.1016/j.joi.2011.05.003>
⁴ Button, K. (1993). *Academic links and communications. Studies of science in Europe*. Aldershot: Avebury
⁵ Barjak, F. (2006). The role of the Internet in informal scholarly communication. *Journal of the American Society for Information Science and Technology*, 57(10), 1350–1367. DOI: <https://doi.org/10.1002/asi.20454>.
⁶ Barjak, F. (2006). The role of the Internet in informal scholarly communication. *Journal of the American Society for Information Science and Technology*, 57(10), 1350–1367. DOI: <https://doi.org/10.1002/asi.20454>.
⁷ Feder, T. (2012). Chile aims to better exploit role as telescope host. *Physics Today*, 65(1), 20–22. DOI: <https://doi.org/10.1063/PT.3.1394>.

Since 2010, NCBR has established cooperation with twelve countries and regions. The timeline presents the highlights of NCBR international cooperation.



- Scientific policy treating cooperation as a tool to increase the effectiveness of research and achieving complex policy goals, including conducting research difficult—or impossible—to implement by a single institution, city, or country¹.
- The belief that collaboration allows achieving better results than non-collaborative research². As collaboration in science is now a common phenomenon, this argument is frequently reformulated as follows: the more intense, broader cooperation, involving more entities and

more diverse entities, the better the effects. For example, publications involving more institutions from a larger number of cities or countries are cited more often than publications with a smaller scope of cooperation³. (Hsiehchen, Espinoza, and Hsieh 2015; Pan, Kaski, and Fortunato 2012).

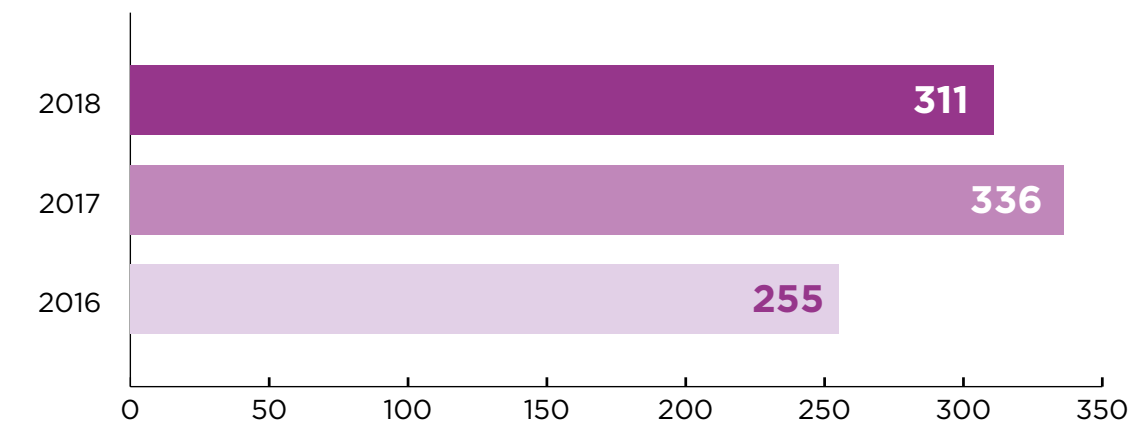
International programmes is a dynamically developing area of activity of The National Centre for Research and Development. International programmes have been divided into two main types - bilateral and multilateral programmes.

NCBR also implemented the Polish-Norwegian Research Programme.

In 2017 NCBR announced 28 international calls for proposals with a dedicated budget of PLN 65 million. A year later Polish applicants could apply for funding in 34 calls with an almost doubled budget - PLN 108 m. In 2018 alone NCBR paid PLN 60 million to national beneficiaries for projects implementation. In 2019 NCBR plans to announce 23 international calls with total budget of PLN 344 million.

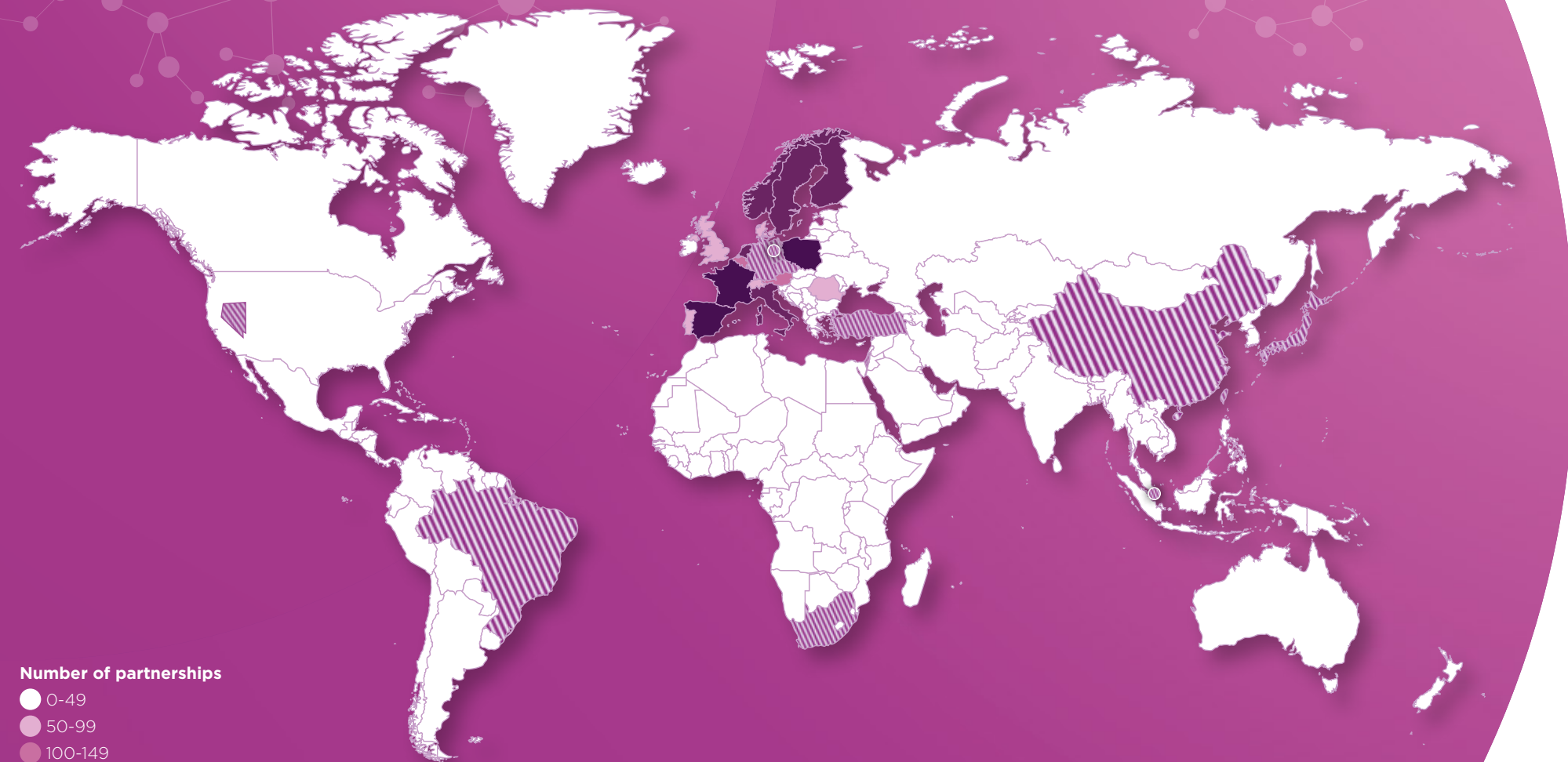
IN 2019 NCBR PLANS TO ANNOUNCE 23 INTERNATIONAL CALLS WITH TOTAL BUDGET OF PLN 344 MILLION.

The number of applications submitted increases annually



¹ Cooke, N. J., Hilton, M. L. (red.). (2015). Enhancing the Effectiveness of Team Science. Washington (DC).
² Katz, J. S., Hicks, D. (1997). How much is a collaboration worth? A calibrated bibliometric model. Scientometrics, 40(3), 541-554. DOI: <https://doi.org/10.1007/BF02459299>.
³ Hsiehchen, D., Espinoza, M., Hsieh, A. (2015). Multinational teams and diseconomies of scale in collaborative research. Science advances, 1(8), e1500211. DOI: <https://doi.org/10.1126/sciadv.1500211>.

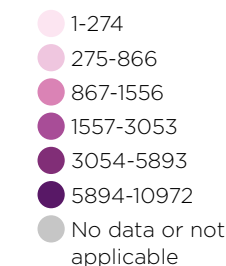
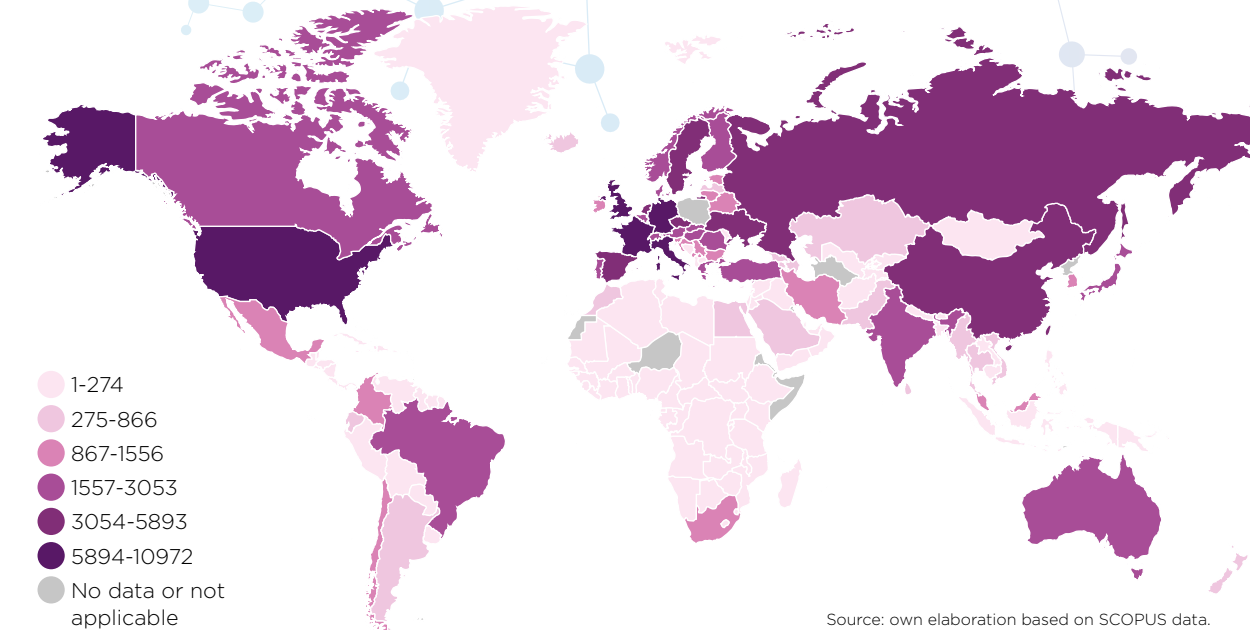
NCBR International cooperation



Number of partnerships



Directions of international collaboration - number of publications with co-authors from Poland in 2016-2018



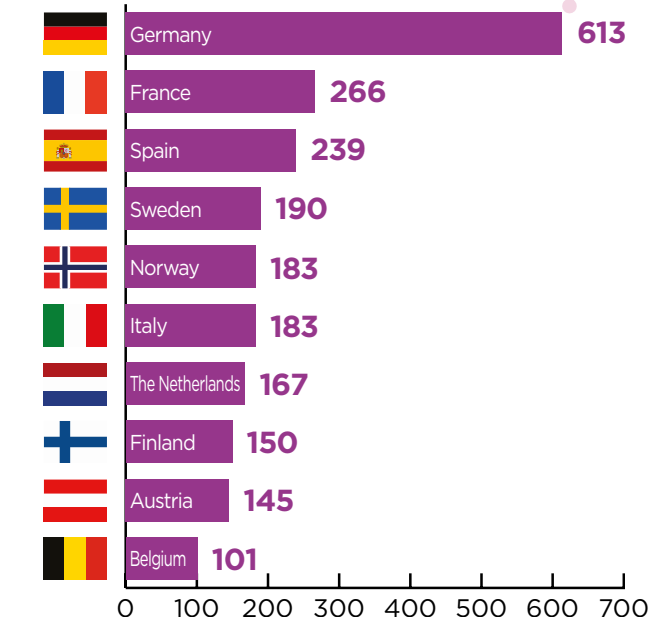
Source: own elaboration based on SCOPUS data.

Implementation of international projects is a unique opportunity for cooperation with scientists from other countries. NCBR supports creating an international network of connections in the area of R&D. Polish research teams carry out intensive cooperation with partners from abroad. More than 3,700 international partners have recently been involved in the activities of projects funded. On average, this translates into 5 foreign entities per project. Only in 2018 Polish beneficiaries have established over 350 partnerships. Poles most commonly cooperate with research teams from Germany, France, Spain and the Nordic countries.

The primary indicator of the internationalisation of science is the number of publications with foreign co-authors (i.e. authors affiliated to foreign institutions).

The main directions of international co-authorship for Polish scientists are countries of Western Europe and the United States of America. According to the Scopus database, in the years 2016-2018 the number of Polish publications written with co-authors from the USA reached 10,972. Germany was the second biggest collaborator: 10,590 publications. The remaining

Top 10 countries - number of international partners



top 20 collaborators are: United Kingdom (8 597), Italy (7486), France (7269), Spain (5893), Netherlands (4199), Switzerland (4193), Russia (4174), Czech Republic (4150), Ukraine (3572), China (3406), Sweden (3382), Belgium (3053), Canada (2964), Austria (2954), Australia (2745), Japan (2716), Portugal (2413) and Greece (2362).

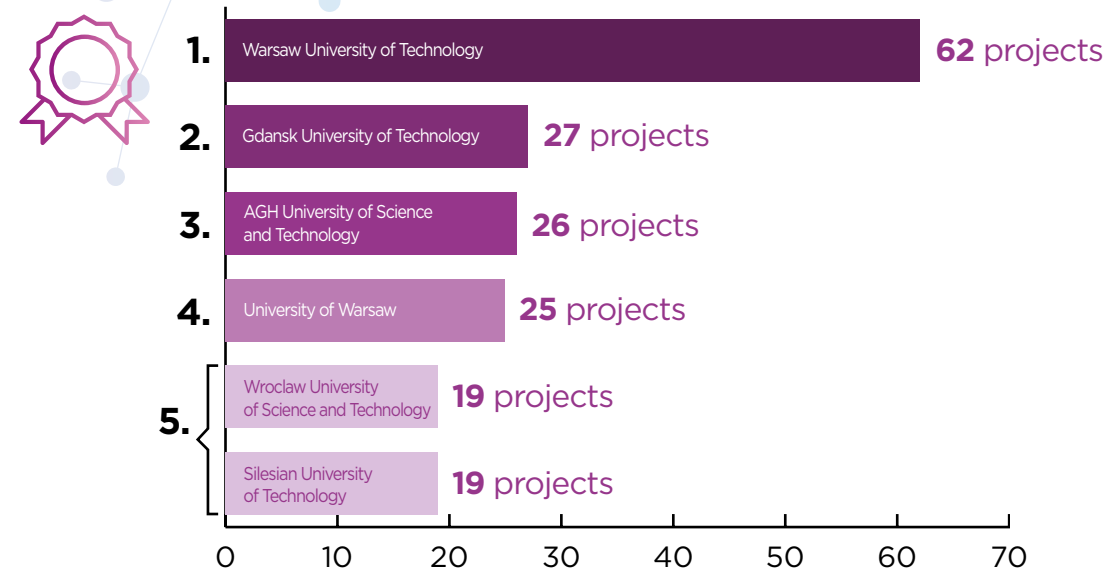
Projects implemented within international cooperation are diverse in terms of their thematic scope. The most popular projects are carried out in the field of engineering and technical sciences.

THE IMPLEMENTATION OF INTERNATIONAL PROJECTS HAS HAD A LOT OF POSITIVE EFFECTS.

Almost every second entity from Poland (46%) engaged in project implementation is a university. The majority of projects – 62 – were coordinated by the Warsaw University of Technology. Research institutes (16%) and scientific units of the Polish Academy of Sciences (15%) are also very active. Almost one out of six beneficiaries of an international programme is an entrepreneur. Every project is implemented by an international consortium but every fifth by a consortium comprised of Polish entities.

The implementation of international projects has had a lot of positive effects. For instance, under Polish-the Norwegian Research Programme, until 2017 over 960 publications were published and 33 patent applications submitted. Only in 2018, Polish scientific teams published over 250 publications in reputable scientific journals, and presented research results at over 500 conferences. Furthermore, international projects promote establishing solid relationships with international partners and have positive social effects.

Polish beneficiaries with the largest number of international projects in NCBR



OVER 250 publications in reputable scientific journals

OVER 500 presented research results at over 500 conferences

Number of projects and value of funding



SCIENCES

148 projects
around
PLN 195 m



ENGINEERING
AND TECHNICAL SCIENCES

496 projects
around
PLN 450 m



MEDICAL
SCIENCES

118 projects
around
PLN 125 m



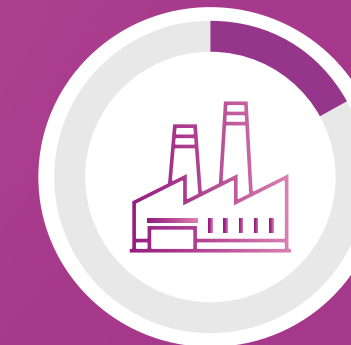
SOCIAL
SCIENCES

29 projects
around
PLN 44 m

Types of Polish beneficiaries



RESEARCH ENTITIES
77%



ENTREPRENEURS
17%



CONSORTIUM OF POLISH ENTITIES
18%

4. MAJOR INTERNATIONAL COOPERATION EVENTS



COOPERATION BETWEEN NCBR AND MATIMOP (ISRAEL) – AGREEMENT SIGNED ON 18 JULY 2010

The first international bilateral programme initiated by NCBR was the cooperation between NCBR and Israeli Industry Center for R&D (MATIMOP/ISERD). In 2010, both institutions signed an agreement to support entities from Poland and Israel in the implementation of research. In the same year, the first Polish-Israeli call for proposals for research and development projects was announced. In the years 2011-2018, further calls were undertaken, but the first three calls for proposals were conducted according to the rules of the EUREKA Initiative. From 2016, subsequent calls have been announced under the Agreement between the Government of the Republic of Poland and the Government of the State of Israel on cooperation in the field of industrial research and development. In the first five Polish-Israeli calls, 7 projects were funded, and the NCBR funding for Polish partners amounted to almost PLN 10 million.

EUREKA AND EUROSTARS – AGREEMENT SIGNED ON 22 JULY 2010.

Poland has been a member of the EUREKA Initiative since June 1995. On October 31, 2007, the Minister of Science and Higher Education contracted the National Centre for Research and Development to conduct all activities related to the participation of Polish entities in the EUREKA Initiative, including the

EUROSTARS programme. The agreement between the EUREKA Secretariat and the NCBR regarding the EUROSTARS-1 programme was signed in Brussels on July 22, 2010. The EUROSTARS-2 programme agreement was concluded between the NCBR and the EUREKA Secretariat on November 25, 2015.

EUROSTARS is a programme between the EUREKA Initiative and the European Union, implemented pursuant to Art. 185 of the Treaty on the Functioning of the European Union (TFEU). It refers to supporting projects carried out by R&D performing small- and medium-sized enterprises.

BILATERAL COOPERATION WITH GERMANY – 2011

Since 2011, the National Centre for Research and Development has been cooperating with the German Federal Ministry of Education and Research (BMBF). The first two calls for proposals were dedicated to the issues of sustainable development, health, climate change and the aging of European society. The third call for proposal had initiated the next stage of cooperation in the area of Digitisation of Economy, aiming at supporting technology transfer to SME's and start-ups in selected areas. So far, in three announced calls for proposals, 159 applications have been submitted, 21 of which received funding for a total amount of over PLN 27 million.

BILATERAL COOPERATION WITH LUXEMBOURG – 2011

The cooperation between the National Centre for Research and Development and Fonds National de la Recherche (FNR) started on the 8 November 2011 by signing Cooperation Agreement. In January 2017 the agreement between NCBR and FRN was prolonged for the next 5 years. The agencies jointly launched 8 Calls for projects in the area of Innovation in services.

LONG TERM COOPERATION BETWEEN NCBR AND THE EUROPEAN INVESTMENT BANK (EIB) – 2011

The European Investment Bank (EIB) has been offering support to the research and development sphere in Poland since 2004, providing very favourable loans for the state budget. EIB's support is reflected in the entire sphere of science in

Poland in the form of a stable budget level in parts dedicated to science, higher education and the Polish Academy of Sciences. If not for the EIB loans, the state budget would have used a more expensive market loan for these purposes.

One of the loan projects run by the Ministry of Science and Higher Education titled Science & Research National Centers concerns research in Polish scientific entities financed by NCBR and NCN. The project was separated in 2011 after the entry into force of the "We build on knowledge" reform and the creation of executive agencies of the Ministry of Science and Higher Education such as NCBR and NCN.

POLISH-NORWEGIAN RESEARCH PROGRAMME – COOPERATION AGREEMENT SIGNED ON 27 AUGUST 2012

Polish-Norwegian Research Programme is a programme conducted under the Norwegian Financial Mechanism. The Programme has been the largest international initiative in the NCBR's history with a budget of over EUR 74 million. Funds provided by the Kingdom of Norway were used to promote research and scientific development as part of cooperation between Norway and Poland. In the years 2012-2017, over 100 scientific projects received funding.

The cooperation is continued within the Programme 'Applied Research' financed from EEA and Norway grants since 2017, where NCBR received a budget of EUR 77.6 m.

COOPERATION WITH TAIWAN – AGREEMENT SIGNED ON 7 DECEMBER 2012.

On 7th of December 2012 the Agreement on Scientific and Technological Cooperation between NCBR and the Ministry of Science and Technology (MOST) was signed. Since then, seven bilateral calls for research proposals have been organised, under which 33



projects have been funded and implemented by teams from Taiwan and Poland. Calls for proposals were initially addressed only to research entities, but in recent years they have been opened also for entrepreneurs.

GO_GLOBAL.PL: SUPPORT FOR INNOVATIVE ENTERPRISES COMMERCIALISING RESEARCH RESULTS AND EXPERIMENTAL DEVELOPMENT WORK ON GLOBAL MARKETS - 2012

GO_GLOBAL programme was established in 2012 to support innovative companies from the SME sector in commercialising research results and experimental development work on global markets. The programme had the following objectives: preparation for entering international markets, including developing a plan for entering selected international markets and obtaining VC capital or another form of internationalisation. 113 companies benefited from the programme and the value of funding amounted to over PLN 20 million.

BILATERAL COOPERATION WITH SINGAPORE - 2013

Since 2013 NCBR has been in charge of bilateral research cooperation with the Republic of Singapore (previously a task of the Ministry of Science and Higher Education). Currently the cooperation is based on the agreement signed in 2017, during the visit of the President of Singapore to Poland. So far six project received funding, three of which are now closed, while others are still under way. Thematic areas include new technologies (Industry 4.0), disruptive technologies and cybersecurity.

COOPERATION WITH JAPAN - 2013

The National Center for Research and Development cooperates with Japan Coal Energy Centre (JCOAL) from 2013. The aim of this cooperation is to support joint activities in the field of development

of innovation and R&D works focused on the development of technologies related the coal utilization and the renewable energies areas, by financing joint Polish-Japanese projects. In 2017, the two Polish-Japanese projects in the field of coal energy were completed.

COOPERATION WITH BERLIN AND BRANDENBURG - AGREEMENT SIGNED ON 20 AUGUST 2013

This specialised - all four calls for proposals dedicated to photonics - and increasingly popular initiative began in 2013 with an agreement signed between NCBR and the Department for Economy, Technology and Research of the Senate of Berlin (current name: Berlin Senate Department of Economy, Energy and Enterprises). In 2016 the parties have been joined by the Ministry of Economy and Energy of Brandenburg. All these three funding institutions effectively combine forces to support bilateral cooperation in the field of research, development and innovation between Poland and the States of Berlin and Brandenburg, with a special focus on cooperation between scientific entities and SMEs. So far, in the three successful calls for proposals, the 7 best projects received funding for over PLN 15 million.

LAUNCHING COOPERATION WITHIN VC FUNDS: JOINT POLISH INVESTMENT FUND - 26 JUNE 2014

As part of international cooperation, NCBR is a cofounder of two venture capital funds - TDJ Pitango Ventures and the Joint Polish Investment Fund.

Under the agreement signed on 26th of June 2014, the first fund named the Joint Polish Investment Fund (JPIF) was established. The parties to the contract are: the National Centre for Research and Development, Adiuvo Management Ltd. as a national partner, Bran Investment S.a.r.l. as an international partner, and Joint Polish Investment Fund

Management B.V., which manages the established fund. In its activities, the Polish-Dutch Fund focuses on projects in the field of medical technologies.

COOPERATION WITH TURKEY - MEMORANDUM SIGNED ON 22 AUGUST 2014

The National Centre for Research and Development has been working with The Scientific and Technological Research Council of Turkey (TÜBİTAK) since 2014. This partnership aims at strengthening Polish-Turkish scientific and technological cooperation. Three calls for joint R&D proposals were launched in years 2014-2018. All three calls for proposals were popular among beneficiaries (113 joint applications were submitted in all calls). 15 Polish-Turkish projects received public funding. Polish applicants received 11,8 mln PLN funding from NCBR.

COOPERATION V4-JAPAN - MEMORANDUM OF COOPERATION SIGNED ON 23 SEPTEMBER 2014

On 23rd September 2014 in Bratislava representatives of research funding institutions from the Visegrad Group (V4) countries and Japan signed a Memorandum of Cooperation (MoC) to promote development of increased cooperation in research and innovation by funding joint research projects.

The following institutions signed the Memorandum:

- Ministry of Education, Youth and Sports, the Czech Republic
- Scientific Research Fund, Hungary
- National Centre for Research and Development, Poland
- Slovak Academy of Sciences, Slovakia
- Japan Science and Technology Agency, Japan
- International Visegrad Fund.

BILATERAL COOPERATION WITH THE REPUBLIC OF SOUTH AFRICA - 2014

National Centre for Research and Development (NCBR) has collaborated with the Republic of

South Africa since signing the Memorandum of Understanding between the NCBR and the National Research Foundation (NRF) in 2014. Following this two joint calls for Polish - South African project proposals were announced. In total 16 Polish - South African projects have received funding representing the various fields: health sciences, agriculture, biosciences and biotechnology, environment and climate change, water and green technology, clean coal technology and ICT.

COOPERATION V4-KOREA - THE MEMORANDUM OF UNDERSTANDING SIGNED IN DECEMBER 2015

The Memorandum of Understanding (MoU) between research funding institutions from the Visegrad Group (V4) countries and Korea was signed in December 2015. The aim of the initiative was to develop cooperation in the field of science, technology and innovation by funding joint projects.

The signatories of the Memorandum are the following institutions:

- National Centre for Research and Development, Poland
- Ministry of Education, Youth and Sports, Czech Republic
- Slovak Academy of Sciences, Slovakia
- National Office for Research, Development and Innovation of Hungary, Hungary
- Ministry of Science, ICT and Future Planning Republic of Korea, Republic of Korea
- International Visegrad Fund

COOPERATION BETWEEN NCBR AND SRI INTERNATIONAL - AGREEMENT SIGNED ON 26TH OF APRIL 2016

In order to make the activities more effective and to exploit the full scientific potential in Poland, NCBR decided to take advantage of the best global practices in the field of managing the process of financing R&D works. For this purpose, the National Centre for Research and Development established cooperation with SRI International – a non-profit



research centre from the United States, a long-term contractor of Defense Advanced Research Projects Agency (DARPA) projects. DARPA, using a proprietary Advanced Research Projects model, has revolutionised the approach to R&D work management and has repeatedly confirmed its effectiveness by allowing the development of breakthrough technologies. The National Centre for Research and Development cooperates with SRI International under the agreement including the implementation of a new management model for advanced DARPA-inspired research programmes.

FIRST CALL FOR PROPOSALS WITH CHINA - LETTER OF INTENT SIGNED ON 21 JUNE 2016

In 2016, in Warsaw the letter of intent regarding cooperation in the field of research and development between the Ministry of Science and Higher Education of the Republic of Poland and the Ministry of Science and Technology of the People's Republic of China (MOST) was signed. The agreement foresaw the organisation of bilateral calls for research proposals in areas identified by both Parties as a priority.

In 2018, the first Polish-Chinese bilateral call for proposals was announced, which assumed support for projects in areas related to medicine development, material engineering, space research, environmental protection, etc. NCBR allocated a record-breaking (as for a bilateral cooperation programme) amount of PLN 13 million for the implementation of selected projects. The joint initiative of the NCBR and MOST garnered much popularity. During the call for proposals 132 applications were submitted, and from among them partners from both countries selected 7 projects for funding.

FINANCIAL SUPPORT FOR PROJECTS SELECTED FROM HORIZON 2020 TEAMING FOR EXCELLENCE PHASE 2 - APRIL 2019

Teaming for Excellence is one of instruments of Horizon 2020 The Framework Programme from European Commission, which funds projects creating new or updating existing centres of excellence in widening countries through a coupling process with a leading scientific institution. The programme has two phases: Phase 1, where funding is provided for consortia to develop a business plan for the future centre and Phase 2, lasting from 5 to 7 years, where consortia selected in Phase 1 receive EUR 15 million financial support to start implementing the future centre.

In the call for proposals announced by the European Commission in 2016, three Polish scientific units were tremendously successful: AGH University of Science

and Technology in Kraków (Sano project), Institute of Electronic Materials Technology (ENSEMBLE³ project) and the National Center for Nuclear Research (NOMATEN project). During phase 1, NCBR supported all projects. As part of phase 2, the NCBR became the coordinator of the SANO project and a partner in the ENSEMBLE³ project.

INTERNATIONAL EMEUROPE CONFERENCE AND ITS NATIONAL IMPACT - 13-14 MAY 2019

On May 13-14 2019, an international conference on electromobility took place in Warsaw. NCBR as a partner of the ERA-NET Cofund Electric Mobility Europe (EMEurope) was the host and co-organiser of the event during which specialists from all over Europe discussed various technological aspects in the area of electromobility and familiarised themselves with the projects implemented under the initiative.

EMEurope is an initiative supporting innovative and promising research projects related to electromobility and zero-emission transport.

COOPERATION BETWEEN NCBR AND STATE OF NEVADA - 2019

NCBR as part of its international activity, also conducts activities supporting ambitious Polish companies in the implementation of the strategy of expansion into foreign markets. After establishing direct contacts by Deputy Prime Minister Jarosław Gowin and the then Governor of the State of Nevada Brian Sandoval, the NCBR undertook efforts to launch an acceleration programme for Polish start-ups. The programme is planned to be launched at the turn of 2019/2020 and its aim is to start cooperation between companies and institutions from Poland and State of Nevada in the area of innovation, including commercialisation of technological solutions. The successful start-ups will take part in three stages of acceleration, starting from workshops in the country and ending with intensive and tailored business training in Nevada.



5. WIDE RANGE OF INTERNATIONAL PROGRAMMES

5.1. MULTILATERAL PROGRAMMES

One of the priorities of the National Centre for Research and Development is multilateral international cooperation. Every year, NCBR co-organises dozens of calls for international R&D projects and funds Polish entities. As part of multilateral cooperation, the National Centre for Research and Development mainly participates in initiatives such as ERA-NET, ERA-NET + and ERA-NET Cofund based on the implementation of the common goal of creating the European Research Area (ERA). Participation in such initiatives consists primarily in establishing international cooperation with European countries and co-organizing international calls for research projects funded from national funds.

Before joining in, NCBR carefully analyses all initiatives and selects those that are in line with national research priorities and which allow to solve important research problems in the best possible way. What is important from the point of institutional commitment is the diversity of research agendas and securing the research needs of various stakeholders. Activities carried out as part of multilateral initiatives are a complementary source of funding in relation to national calls for proposals, and for applicants may be an additional opportunity to apply for financial support for research.

As the largest agency funding R&D projects in Poland, NCBR is actively engaging in

international cooperation. NCBR usually participates in initiatives in the field of medical, technical and agricultural sciences. In Horizon 2020, Poland at the country level is involved in 44 various initiatives and the success rate for projects that have received funding is over 12%. At the level of funding agencies, the NCBR as one of several institutions in Poland is the most involved in this type of cooperation. In the case of ERA-NET Cofund, NCBR participates in the largest number of initiatives compared to other countries in this category. In 2018, the NCBR participated in 14 initiatives and actively co-organised calls for international research projects. In 2019, a majority of these initiatives are continued.

ERA-NET multilateral initiatives allow Polish scientists to have a broader view on the research issues. Scientists applying for funding have the opportunity to join efforts to solve a specific research problem with scientists from abroad. These are often also marketing effects for scientific units, which as a result of international projects are becoming more and more recognisable on the international arena. Polish research teams are eager to engage in projects financed under the ERA-NET type initiatives. International projects have a positive impact on the internationalisation of Polish

NATIONAL CENTRE FOR RESEARCH AND DEVELOPMENT MAINLY PARTICIPATES IN INITIATIVES SUCH AS ERA-NET, ERA-NET + AND ERA-NET COFUND.

science and research teams, and scientists have possibility to start cooperation with outstanding international experts and within the framework of projects they can set increasingly ambitious research goals. In NCBR's experience, these projects have enabled research in various countries and with a multidisciplinary approach to research problems, and many scientists have confirmed the thesis that international projects are an important pillar of their research activity.

Another important aspect of multilateral international cooperation are initiatives other than ERA-NET, in which NCBR participates



and Polish applicants are successful. This group of programmes includes programmes co-funded by the European Commission such as AAL, BONUS-185, EUROSTARS or Teaming for Excellence as well as those that do not receive such support – CORNET, EUREKA, V4-Japan Joint Research Program (in most cases), V4-Korea Joint Research Program. NCBR participates in calls designed to fund international projects selected for funding with joint forces of various countries.

An important branch of international cooperation are programmes based on Article 185 of the European Treaty (TFEU). These programmes are solidly anchored at the level of the European Commission and constitute an essential aspect of international activity at the level of European Union member states and beyond. The aim of the programmes is to join forces to solve important social and economic problems, such as improving the quality of life of elderly based on digital technologies or problems of the Baltic Sea. NCBR actively supports projects funded under these initiatives. By participating in AAL, EUROSTARS and BONUS-185 programmes, over the last 10 years NCBR has provided support to 91 projects worth over PLN 67 million.

Another important programme in which NCBR participates is the CORNET Initiative, which has been functioning as an independent network of funding agencies from countries or regions for several years, without financial support from the European Commission. Every year, this network organises two calls for international R&D projects dedicated to research solving industry problems. What characterises this initiative is the specific type of applicant, which can be an association of entrepreneurs representing the interests of a specific industry. So far, NCBR has funded 36 projects and the financial support granted has exceeded PLN 36 million.

5.2. BILATERAL PROGRAMMES

Bilateral cooperation helps carry out the mission of the National Centre for Research and Development in terms of supporting Polish science units and enterprises in developing their ability to create and apply solutions based on research results. This is done to boost the economy with a developmental impulse for the benefit of society. It also contributes to strengthening the position of Polish units in global and European research area and in international projects carried out jointly with foreign researchers. By initiating and concluding formal bilateral agreements on cooperation with foreign partners, NCBR takes into account the following factors: priority thematic areas, economic benefits, geographical proximity, the best experience of international cooperation of Polish scientists, cultural relations, as well as historical relations at the level of states and research units.

When it comes to bilateral calls for proposals, both their budget and thematic areas are the result of discussions between NCBR and partner institutions. In 2018, NCBR implemented bilateral programmes with the following countries and regions: Berlin/Brandenburg, China, Germany, Israel, Luxembourg, Singapore, South Africa, Taiwan and Turkey. The total allocation on the above programmes amounted to over PLN 25.5 million. Most applications were received under calls for proposals with China, Germany, Taiwan and Turkey. One can therefore say that initiatives with less thematic restrictions and oriented towards cooperation with a given region or applicant type prove to be most effective. It can be concluded that greater efficiency shows call with a wide thematic focus.

From the point of view of funding agencies, bilateral partnerships may not appear very effective, as participation in them involves a large administrative burden which not necessarily translates into a large number and value of the projects funded. It is however a kind of grassroots work that allows beneficiaries to build their cooperation networks

and gain the necessary experience. This helps them apply for much larger funds in competitions from the main part of the EU Framework Programmes. Thanks to the participation in international projects, we can observe the growing independence of Polish research teams, as well as the awareness and knowledge of their back offices that manage projects from the formal and financial side.



THE TOTAL ALLOCATION ON THE ABOVE PROGRAMMES AMOUNTED TO OVER PLN 25.5 MILLION.

5.3. POLISH-NORWEGIAN RESEARCH PROGRAMME

The Polish Norwegian Research Programme has been conducted under Norwegian Financial Mechanism. Funds from Kingdom of Norway were used for research promotion and scientific development in cooperation with Poland and Norway. In the years 2012-2017, 75 bilateral projects were funded from the following areas: environment, climatic changes, social sciences, gender equality, health and carbon capture and storage. In addition, 34 projects were funded under the Small Grant Scheme - SGS, a call dedicated to research projects implemented by women in technical sciences.

The aim of the programme was to reduce social and economic disparities and extension of bilateral cooperation through popularisation and enforcement of research. The reduction of disparities has been achieved by strengthening research capacity and a broader application and dissemination of research results. It has been confirmed by a high number of scientific publications (1069) and a significant level of practical implementation of project results in the industry (33 patent applications) and within the society. The higher than expected number of publications is a success particularly for Polish science, achieved through cooperation with Norway. Programme has also contributed to reduction of gender disparities in Polish science allowing women-scientists developing research in the least feminised areas. The Small Grant Scheme participants assessed that this kind of support is very useful for women-scientists, especially at the beginning of their career.

An additional aim of the programme was to strengthen bilateral relationships. The majority of research teams admitted that Polish-Norwegian cooperation was very satisfying and resulted in stronger mutual contacts and relationships. During cooperation it has been proven that both

countries have a lot of strengths that can be offered to other side. In the case of Poland this is an effective research infrastructure, strong tradition of experimental science, and low costs of research. Norway offers strong theoretical fundamentals, experience in modelling and wide access to scientific journals. Not only Polish but also Norwegian partners noticed positive effects of cooperation. The latter appreciated access to newest research infrastructure, new technologies and networks and also enthusiastic and ambitious scientists interested in the publication of research results.

Positive effects of the programme continue after its completion. In many cases, partners are still conducting outreach activities, research results dissemination as well as exchange good practices. In some projects the obtained results transcended scientific areas and had been implemented at the regional or national level.

Most of the project beneficiaries declared their willingness to continue cooperation, and in 11 cases official cooperation agreements were signed.

The next edition of Norway grants and European Economic Area has started from an agreement between Poland and the Donors signed in 2017. On the basis of this agreement, the National Centre for Research and Development implements The Applied Research Programme, where Polish scientific organisations and entrepreneurs can apply for more than EUR 73 million funding for innovative research projects, including over EUR 6 million dedicated to ground-breaking research projects selected in the unique IdeaLab competition, EUR 12 million dedicated to collaborative research projects in the area of carbon capture and storage and EUR 5 million for the Small Grant Scheme for female researchers in applied technical sciences. The programme will also contain activities supporting young scientists in their research career development.

THE AIM OF THE PROGRAMME WAS TO REDUCE SOCIAL AND ECONOMIC DISPARITIES AND EXTENSION OF BILATERAL COOPERATION.

To sum up, participation in international programmes is beneficial both for NCBR and our beneficiaries, as it allows to fund the participation of Polish entities international R&D projects on topics of high transnational importance. Thanks to international scientific collaboration Polish entities gain a number of benefits:

- increasing productivity (e.g. number of publications),
 - improving the quality of scientific outputs (e.g. number of citations),
 - increasing the likelihood of identifying mistakes,
 - cost reduction,
 - access to unique resources, both tangible (e.g. research infrastructure) and intangible (knowledge, experience),
 - increasing international recognition of individuals and institutions involved in collaboration (through a network of informal contacts).
- This would not be possible only through domestic programmes and calls for proposals.

6. OTHER NCBR INITIATIVES AND ITS INTERNATIONAL CONTEXT

6.1. COOPERATION WITH SRI

In order to increase the effectiveness of NCBR as an Intermediate Body in Smart Growth Operational Programme and to make full use of Poland's scientific potential, NCBR decided to apply the best global practices in the area of managing the process of financing R&D works. In 2016, in order to fulfil this task NCBR started cooperation with SRI International – an independent, non-profit research centre from the USA, a long-term research projects performer of Defence Advanced Research Projects Agency (DARPA). DARPA applying its own Advanced Research Projects model has revolutionised approach to R&D project management and many times has proven its effectiveness by creating breakthrough technologies. NCBR has been cooperating with SRI International since 26 April 2016 when the cooperation agreement had been signed and concerns implementation in NCBR new model of management of advanced research programmes inspired by DARPA. Under the existing cooperation, NCBR has done groundwork to implement the new model and has defined rules for implementation, e.g. several workshops and study visits took place which resulted in a comprehensive handbook for NCBR describing rules of new model in Polish conditions, and subsequently launched research programmes

based on the developed rules. Currently, the implementation phase is taking place, during which SRI International experts are supporting NCBR in the implementation of those programmes. Cooperation at this stage consists of SRI Experts' support for the programme manager and the programme team in defining substantive scope and programme management and subsequently its proper implementation.

SRI International has supported NCBR in preparation, and currently is assisting in implementation of the Hydrogen storage programme. The main aim of the programme is to develop Hydrogen storage technology, which in the future could be applied to power fuel cells, order of prototype of innovative hydrogen storage and its demonstration in mobile facilities. The programme has been launched in May 2018 with participation of Eight contractors and currently (2019) five research teams are taking part in its second phase. The programme will be finished in the second quarter of 2022.

Another project in which SRI International supports NCBR is the preparation and implementation of technological competition sort of Grand Challenge – a unique competition

SRI INTERNATIONAL HAS SUPPORTED NCBR IN PREPARATION, AND CURRENTLY IS ASSISTING IN IMPLEMENTATION OF THE HYDROGEN STORAGE PROGRAMME.

for innovators, researchers, inventors and enthusiasts of new solutions. The Grand Challenge is a form of competition with a clear objective, a short term for task solution, and clearly defined prize; in addition, it does not require large financial resources. Grand Challenge is a kind of a race in which reward is awarded to the best. Its thematic scope has been already chosen and the competition will be announced at the end of 2019.

6.2. FOREIGN VC FUNDS – TDJ PITANGO VENTURES AND JOINT POLISH INVESTMENT FUND

BRIDGE VC Programme implemented by the National Centre for Research and Development aims to boost investments in the development of new technologies. The programme allows to implement projects with both Polish and foreign entities, mainly with companies managing high-risk funds or investment companies. It is the first instrument in Poland offering public-private support for the commercialisation of R&D results with the participation of venture capital funds.

As part of international cooperation, the NCBR is a co-founder of two VC Funds – TDJ Pitango Ventures and Joint Polish Investment Fund. Both funds were established with the support of public funds from the National Centre for Research and Development under the BRIDGE VC Programme and with the support of foreign entities experienced in this type of activities.

TDJ Pitango Ventures is a Venture Capital fund which combines the public funds of the NCBR, private Polish investment company TDJ S.A. and the know-how of the Israeli partner Pitango Venture Capital to support the most interesting R&D projects of Polish companies. The fund invests in technological start-ups with global potential and supports projects of companies during the stage of early growth. The main areas on which the fund focuses are: big data, Internet of Things (IoT), artificial intelligence and machine learning, medical devices and digital health, mobile technologies, and SaaS. So far, TDJ Pitango Ventures has invested in five projects: StethoMe – a project designed to create an electronic wireless stethoscope, CallPage – a system analysing customer behaviour on the website and enabling fast contact with the client, Cosmose – a company dealing with behavioural targeting technology, Neptune.ml – a platform

created for data scientists, and Tylko – an application that allows to order personalised furniture.

Joint Polish Investment Fund (JPIF) is a Venture Capital fund established by the National Centre for Research and Development, Aduvo Management Ltd., a Polish company investing in biomedical projects on international markets, Bran Investment S.a.r.l., a Dutch partner and Joint Polish Investment Fund Management B.V., which runs the fund. The Joint Polish Investment Fund focuses on medical and digital health technology projects which have potential for rapid growth and commercialisation. So far fund has invested in the following projects: MANTA developing a device allowing to measure concentration and distribution of nanoparticles, SoundObject – a project in the field of sound engineering and signal processing, MySpiro – a project aiming at development and commercialisation of a small and mobile electronic spirometer, pHase II – developing a miniature pH sensor for minimal measurements, ScaleThings developing a thin, flexible and portable scale for individual and hospital use.

THE NCBR IS A CO-FOUNDER OF TWO VC FUNDS – TDJ PITANGO VENTURES AND JOINT POLISH INVESTMENT FUND.

6.3. GO_GLOBAL.PL – INCREASING THE COMMERCIALISATION SCALE OF SCIENTIFIC RESEARCH OR DEVELOPMENT WORKS OF POLISH COMPANIES ON GLOBAL MARKETS.

This horizontal programme was designed for innovative micro, small and medium enterprises, operating in the high and medium-high technology sector. The first pilot edition was organised in 2012 and the second edition in 2016.

The aims of the programme assumed: preparation for entering international markets by assessing the possibilities of commercialisation of an innovative product or service and the strength of competition, developing a plan for entering the selected market and obtaining VC capital or another form of internationalisation.

The NCBR research shows that as much as 80% of beneficiaries of the programme found at least one business partner on foreign markets, and 17% found an investor. Every fifth entrepreneur opened a foreign office or a representative office, while every third beneficiary noted an increase in sales of the products and services offered. In addition, in the Go_Global.PL programme, 70% of entrepreneurs declared the introduction of a new product or service on a foreign market. Beneficiaries were very fond of the transparent and relatively simple application procedure and great budgeting flexibility.

Examples of actions funded in the programme included the development of an internationalisation strategy, analysis of international markets, training and coaching in the areas of legal and cultural requirements of the market and intellectual property management, identification of key business partners or cooperation with foreign business advisors for the development of innovative markets in the area of establishing contacts, fine-tuning of the market strategy, and preparing the tactics of entering the foreign market.

As part of GO_GLOBAL.PL, NCBR cooperated with several strategic partners in the field of acceleration of technology companies, including the US-Polish Trade Council (USA), Plug & Play Tech Center (USA), Fraunhofer MOEZ (Germany), Flinders Partners (Australia) or ISDI: Instituto Superior para el Desarrollo de Internet (Spain).

7. SELECTED FLAGSHIP PROJECTS FUNDED UNDER INTERNATIONAL PROGRAMMES

MISCOMAR – POLISH COORDINATOR OF AN INTERNATIONAL PROJECT

Basic info:

- beneficiary: The Institute for Ecology of Industrial Areas (IETU)
- programme: ERA-Net Cofund FACCE-SURPLUS
- project title: MISCOMAR – Miscanthus Biomass Options for Contaminated and Marginal Land: Quality, Quantity and Soil Interactions
- project duration: 01.06.2016 – 31.05.2019
- value of the project: EUR 580 000
- international project partners: Aberystwyth University (UK), University of Hohenheim (Germany)
- project coordinator/respondent: Marta Pogrzeba DSc hab., Professor of IETU, Jacek Krzyżak DSc

How have you established cooperation with foreign partners?

We collaborate with the Universities of Aberystwyth and Hohenheim in the MISCOMAR project for the first time. For more than 10 years, The Institute for Ecology of Industrial Areas (IETU) has been cultivating energy crops on heavy metal contaminated soils, including Miscanthus – a long-term grass whose biomass can be used for the production of renewable

energy, in the future replacing conventional resources such as coal. We met with partners during “Miscanthus safari” organised by the University of Aberystwyth, to which we were invited by a mutual friend. During the discussion an idea came up to join forces and use the IETU experience related to the problem of heavy metal contaminated soils and the partners’ knowledge on the breeding and cultivation of Miscanthus. Before the meeting, we “knew” each other only from the scientific literature.

Is it worth it to implement international projects with institutions from Poland?

For many years, IETU has been a leading Polish institution in the implementation of many international projects; therefore, international partners are willing to cooperate with us, knowing that we are a reliable partner able to carry out all assigned tasks. The fact that we were implementing another project related to the cultivation of energy crops on contaminated soils, Phyto2Energy financed under the 7th Framework Programme, was important for our partners who decided to work with us on the MISCOMAR project. Cooperation with IETU in the MISCOMAR project has enabled both international



Miscanthus plantation before winter harvest.



General view of Miscanthus plantation.

partners to gain new experiences in research about contaminated soils. Our research polygons are a valuable contribution in obtaining new knowledge and testing new solutions. The best answer to the question whether it is worth to implement projects with Polish institutions is the fact that we are preparing another international proposal, and in the meantime we have completed several expertises for the University of Aberystwyth in the field of soil quality assessment.

What kind of benefits have you gained from the implementation of an international project?

Cooperation with global specialists dealing with Miscanthus, such as Prof. John Clifton-Brown from Aberystwyth University and Prof. Iris Lewandowski from the University of Hohenheim is a distinction for us, but also testifies to the level of research conducted in our institute. The greatest benefit of the project was access to the latest knowledge in the field of breeding and cultivation of Miscanthus. This cooperation will certainly increase the recognition of IETU in the scientific community, dealing with the broadly understood problem of

biomass as a renewable energy source, and thus the opportunity to acquire new research projects.

What are the results of the project?

With the joint research, we increased our knowledge about the benefits of growing Miscanthus on marginal soils. We investigated whether and how the cultivation of Miscanthus improves soil properties and how the cultivation in marginal land affects the quality of biomass for anaerobic digestion or combustion. Some of the research results have already been published in leading global journals in the field of bioenergy and environmental pollution, such as Global Change Biology Bioenergy and Environmental Pollution.

What are your plans for the future?

We plan to continue cooperation with our partners from the MISCOMAR project in the field of growing Miscanthus on set-aside and polluted soils. In particular, the research will concern new cultivation techniques on such soils as well as biomass processing technology, not only for energy purposes but also for the use in other branches of industry. We jointly submitted proposal for the third ERA-Net FACCE SURPLUS call for proposals, inviting to consortium the next scientific partner from Poland – Research and Innovation Centre Pro-Akademia. Therefore, we expect fruitful scientific cooperation in the following years.



Miscanthus giganteus before winter harvest.



TROLLEY2.0 – FUTURE OF ELECTRIC MOBILITY

Basic info:

- beneficiary: University of Gdansk
- programme: ERA NET Electric Mobility Europe (EMEurope)
- project title: Trolley 2.0 – Trolley Systems 4 Smart Cities
- project duration: 01.04.2018 – 30.09.2020
- value of the project: EUR 3 000 000
- project partners: trolley-motion, Austria, Barnimer Busgesellschaft mbH, Germany, evopro Group, Hungary, Power Research Electronics BV, The Netherlands, Szegedi Közlekedési Kft., Hungary, Szegedi Tudományegyetem, Hungary, Technical University of Delft, The Netherlands, Technische Universität Dresden, Germany
- respondent: Marcin Wołek DSc

How have you established cooperation with foreign partners?

The project was the result of earlier cooperation with foreign scientific units. In February 2010, the University of Gdansk together with the Municipality of Gdynia joined the TROLLEY project (Central Europe Programme), which aimed to assess the potential of trolleybus transport. Marcin Wołek (DSc) and Professor Olgierd Wyszomirski from the University of Gdansk initiated the project preparation on the Polish side. Research on trolleybus was continued in many international research projects funded under FP7 (CIVITAS DYN@MO) and Horizon2020 (ELIPTIC). The development of trolleybus transport has been also continued in Gdynia on the basis of in-motion-charging scheme. A logical continuation of the above is the TROLLEY 2.0 project.

Is it worth it to implement international projects with institutions from Poland?

Thanks to the participation in previous projects, a team of scientists representing mainly the Faculty of Economics of University of Gdansk has established a strong position as a reliable and competent partner in the field of market and economic-operational analysis of urban transport with particular emphasis on electric means of transport. The advantage pointed out by foreign consortium members is the practical experience of our team and the high substantive level of our analyses.

What kind of benefits have you gained from the implementation of an international project?

The main benefits we have gained so far are mainly the deepening of international cooperation with important foreign universities (e.g. TU Delft) and urban transport operators implementing innovative solutions in the field of electromobility. The access to technical and operational data as well as economic data has been facilitated by the international cooperation and it was a starting point for analyses and scientific research carried out at the Faculty of Economics of the University of Gdansk. Moreover, it significantly influenced the expansion of scientific staff by enabling employment of leading experts in the field of economic and operational analysis of electric transport.

What are the expected results of the project?

The main objectives of Trolley 2.0 project is to prove that trolley-battery-hybrid buses are the proper technology for extensions of trolleybus networks and replacement of Dieselbus lines in European cities. The majority of tasks carried out by the University of Gdansk include an

trolley:2.0 for smart cities

assessment of the current state of the batteries development, development of the concept of intelligent energy storage system on traction substations, and creating an extended cost-benefit analysis model that will be used to compare road electric vehicles, based on data obtained from cities in Poland where trolleybus transport already operates (Gdynia, Tychy, Lublin). Because the project is performed in close cooperation with public transport operators, its vital part consists of operational and demo tests (i.e. midi-trolleybus).

What are your plans for the future?

In the future, we plan to continue research in the field of electromobility along with the assessment of the effectiveness of the use of alternative energy sources and carry out comparative studies of electric urban transport systems in Europe. Together with the research team, we would like to continue research within international research consortia and apply for funding from national and European funds.

Trolleybus of route 34 in Gdynia on the section without traction network. Loading in motion is one of the determinants of further development of trolleybus transport and an element of analysis under the TROLLEY 2.0 project.



SOLTREN – COOPERATION WITH COUNTRIES FROM LATIN AMERICA

Basic info:

- beneficiary: Lodz University of Technology
- programme: ERANet-LAC: Latin America, Caribbean and European Union
- project title: Solar hybrid translucent component for thermal energy storage in buildings - SOLTREN
- project duration: 02.01.2017 – 31.12.2019
- value of the project: EUR 459 568 00
- project partners: Instituto de Investigaciones en Energía No Convencional (Argentina), Institute of Physical Energetics (Latvia), Pontificia Universidad Católica de Chile (Chile)
- respondent: Dariusz Heim DSc Eng., Prof. of the Lodz University of Technology

How have you established cooperation with foreign partners?

The initiator and originator of the project was the Lodz University of Technology, which took the role of the project coordinator. We have had informal contacts with some partners. Some

partners have been invited to participate based on recommendation from foreign universities. Others were acquired through direct contacts, including participation in international scientific and technical associations. We and the professor from Chile have known each other for many years mainly due to our activity in the IBPSA (International Building Performance Simulation Association) and participation in numerous international conferences. We established contacts with partners from Latvia thanks to our activity in the ISES (International Solar Energy Society), which deals with issues related to the effective use of solar energy.

Is it worth it to implement international projects with institutions from Poland?

The Lodz University of Technology has very good scientific and research facilities. We constantly involve in research young scientists, including PhD students, for whom participation in research projects is an opportunity to implement interesting topics. The publication and high international position of

many scientists employed at the Lodz University of Technology makes international partners interested in cooperation with us. This results in a large number of submitted grants and a high success rate as well as a constantly growing number of short- and long-term scientific internships.

What kind of benefits have you gained from the implementation of an international project?

Cooperation within the project allowed us to formalise previous contacts, discount the results of previous work and open new research topics. As a result of joint activities, there was an exchange of academic staff, especially young people, as part of short and long-term study visits. The opportunity to participate in prestigious international scientific conferences at which project results were presented was also valuable. Research and its continuation will also allow for the further development of young scientific staff, including the implementation of new topics of doctoral dissertations.

What are the results of the project?

As a result of the project, proprietary calculation models for heat transport and short-wave radiation through glazing filled with material with variable physical properties were developed. Prototypes of innovative components were made in the form of glazing filled with paraffin with designed, assumed properties. A number of tests were carried out to examine the constituent materials of new products. One joint scientific article has been submitted, and another three are in preparation.

What are your plans for the future?

During the project, we hosted doctoral students from Argentina and Chile at the Lodz University of Technology. The visits lasted from 2 weeks to 3 months and allowed for joint research and start of new research topics, mainly in the area of energy efficiency. The possibility of obtaining further funding for their implementation will depend on the scope of new calls for research projects.



FUNGLASS – MULTIFUNCTIONAL GLASS

Basic info:

- beneficiary: D.A.Glass Sp. z o. o.
- programme: SOLAR-ERA.NET
- project title: FunGlass – Multi-Functional Glass for PV Application
- project duration: 1.03.2016 – 28.02.2018
- value of the project: EUR 1 147 801
- project partners: Fraunhofer CSP (Germany), J. v. G. Thoma GmbH (Germany)
- respondent: Przemysław Ząbek DSc

How have you established cooperation with foreign partners?

For 7 years we have been conducting scientific research at the University of Wageningen in the Netherlands and Fraunhofer CSP in Germany on modification of the anti-reflecting glass. Wageningen University as a leader in greenhouse cultivation research has rated our products as the most optimal for the photosynthesis process due to effective light scattering, which directly affects the increase of crop yields, e.g. tomato or cucumber. Our glass sale on a global scale and the results of cooperation with Wageningen University were noticed by Fraunhofer CSP, which rightly noticed that the improvement of optical parameters obtained due to our technology could be applied in renewable energy e.g. in photovoltaics. After the preliminary tests, it was found that the increased light transmission increases the PV panels energy efficiency and solar collectors. This information was an incentive for us and Fraunhofer CSP to prepare a proposal about research on structured glass with a self-cleaning function and increased transmittance, which was submitted to SOLAR ERA-NET Programme.



DA|GLASS

Is it worth it to implement international projects with institutions from Poland?

The implementation of international research projects potential of D.A.Glass Sp. z o. o. is at a very high level. This is due to the company's great innovation potential, which was noticed by a foreign partner (Fraunhofer CSP), and used in the project to receive PV modules with new functionalities. It should be emphasised that on the Polish market there are practically no entities operating in the field of flat glass processing on such a scale as D.A.Glass Sp. z o. o. The potential is also demonstrated by the sale of millions square meters of glass per year for greenhouse cultivation exported to the USA, Canada, Japan and Australia, which is undoubtedly a showcase of high quality products on the European and global markets.

What kind of benefits have you gained from the implementation of an international project?

Implementation of a project within international cooperation has undoubtedly increased the recognition of our products at international conferences and trade fairs, e.g. GreenTech in Amsterdam, European PV Solar Energy Conference and Exhibition and Fruit Logistica in Berlin. In addition, local and foreign partners have gained the opportunity to consult the use of our products and technologies with foreign institutes such as Fraunhofer and Wageningen University. The implementation of the project also increased international cooperation between D.A. Glass Sp. z o. o., and our foreign partners and has allowed us to establish new contacts.

What are the results of the project?

As part of the project, we have managed to develop products with increased parameters.

Representatives of the D.A.Glass sp. z o.o. research team: Przemysław Ząbek, PhD (project manager) and Aleksandra Bonowicz, Msc, Eng. at the research stand for research in the field of photovoltaics.

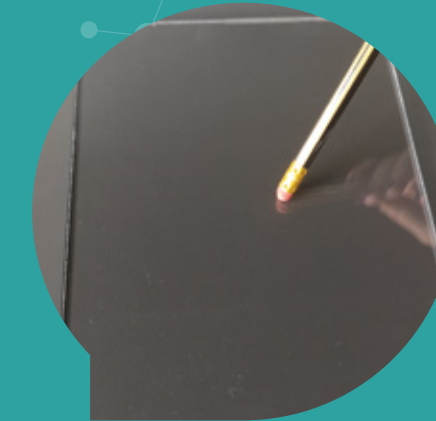


Photo on the left - glass with self-cleaning coating (diamond-like).
Picture on the right - glass without a coating.

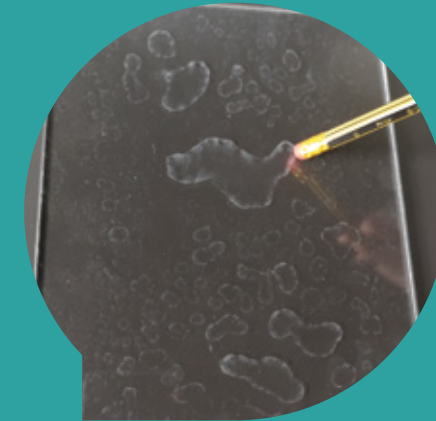


Photo on the left (upper part) - glass with a hardening coating (diamond-like).
Photo on the left (bottom part) - glass without a coating.

A significant increase in energy efficiency has been observed for the various modules with the glass used. In addition, in the experiment testing self-cleaning function a reduction of permeability losses has been observed for the glass with the anti-reflective layer (AR) as compared with the reference glass, i.e. chemically unmodified glass. This is important for photovoltaic panels located near airports and in a desert climate, where panels are exposed to strong exposure of sand and dust particles. The results of the project were presented in Amsterdam in September 2017 at EU PVSEC, the largest international Conference for Photovoltaic research.

What are your plans for the future?

This year, we have introduced a new product obtained by magnetron technique – “diamond-like glass” with hardness similar to a diamond. The treatment gives the glass features of resistance to external chemical factors and mechanical impact. We would like to continue our research in this field and we are interested in participating in international projects of the ERA-NET type. International projects are for us a very interesting solution allowing for conducting advanced research work with the participation of prestigious scientific units or international business partners.

RIGRID – RURAL INTELLIGENT GRID

Basic info:

- beneficiary: Electrum sp. z o. o.
- programme: ERA-Net Smart Grids Plus
- project title: Rural Intelligent Grid - RIGRID
- project duration: 01.05.2016 - 30.04.2018
- value of the project: EUR 1 105 835
- project partners: Fraunhofer IFF, Niemcy; Harz-Regenerativ-Druiberg, Germany, Regenerativ Kraftwerke Harz, Germany, Warsaw University of Technology (Electrical Power Engineering Institute), Poland, European Copper Institute in Warsaw, Poland
- respondent: Mirosław Popławski DSc Eng.

How have you established cooperation with foreign partners?

The initiators of the RIGRID project funded under the ERA-Net Smart Grids Plus Initiative were well-known international partners: Electrum Ltd. – Polish technological engineering company specializing in the preparation, comprehensive implementation and servicing of investment projects and facilities in the areas of energy and industry, and Fraunhofer Institute for Factory Operation & Automation IFF, a German scientific and business organisation dealing with applied research implementation in industry.

Is it worth it to implement international projects with institutions from Poland?

Cooperation with selected Polish institutions undoubtedly raises the level of implemented projects and generated solutions. This is particularly important in the case of cooperation between professional, highly specialised technology companies such as company Electrum Ltd. and selected scientific units such as Electrical Power Engineering Institute of the Warsaw University of Technology, even if in the area

of energy and information, the practical competences of the majority of market and scientific entities are still being built.

What kind of benefits have you gained from the implementation of an international project?

The implementation of the RIGRID project has enabled to verify the operation of the island installation operating in the real system together with a demonstrator including energy storage. The RIGRID project was recognised in May this year with the 2019 ISGAN Award of Excellence in Smart Grid for Local Integrated Energy Systems (Microgrids), which is awarded for innovative solutions in the field of smart grids.

What are the results of the project?

The aim of the project was to develop the methodologies, tools and demonstration in the field of smart grids regarding three research layers – technological, economic and social. An additional effect of RIGRID project implementation is the development and commercialisation of the EMACS system (Energy Management & Control System), which combines the advantages of a classic SCADA data acquisition and control system, IoT platform and a system for micro grid with Business Intelligence software.

What are your plans for the future?

The company Electrum Ltd. continues its business activities, including the areas of Smart Grid and innovative management of energy assets. Together with our foreign partner, Fraunhofer Institute, we intend to apply and participate in further international projects, e.g. as part of subsequent call for proposals organised as part of ERA-Net Smart Grids Plus and Horizon 2020.



PETRA – COOPERATION WITHIN EUROSTARS

Basic info:

- Beneficiary: VIGO System S.A.
- programme: EUROSTARS-2
- project title: PETRochemical analyser - PETRA
- project duration: 01.10.2015 - 30.09.2017
- value of the project: EUR 1 393 498
- project partners: IRsweep GmbH, Switzerland, Alpes Lasers SA, Switzerland
- respondent: Waldemar Gawron DSc Eng.

How have you established cooperation with foreign partners?

The PETRA project was the result of previous cooperation with foreign partners and the initiator of this particular project was IRsweep GmbH. The company previously used infrared detectors and detection modules produced by VIGO System S.A. that has been is the recipient of our products. With our second international partner Alpes Lasers SA, producer of cascade lasers, we also had a lot of contact in the past. In the “PETRochemical analyser” resulting from this project, IRsweep GmbH, leader of consortium, used the products of both international partners.

Is it worth it to implement international projects with institutions from Poland?

The potential of Polish entities to implement international projects is certainly high. It requires only greater openness and self-confidence, and it often turns out that you are a valuable partner in the implementation of international projects. We are well prepared to carry out international research projects and we have a lot of experience in their implementation. We have already participated in seven completed international projects and we are currently participating in the next four, including projects co-financed by the National Centre for Research and Development under the EUROSTARS-2 programme. Other are projects

implemented under FP7 and H2020. The implementation of the international project gives us the opportunity to consolidate the leading position on the market of non-cooled infrared detectors and additionally enables better understanding of global development trends in the areas in which our products are used.

What kind of benefits have you gained from the implementation of an international project?

The PETRA project, from the point of view of VIGO S.A., can be considered as a success story. Our foreign partners in this project were the companies with which we had previously cooperated and which were recipients of our products, infrared detectors and detection modules. As part of the PETRA project, we have developed an innovative ultrafast detector module which is a component of the petrochemical analyser, in which Alpes Lasers SA lasers were also used. The design of the entire analyser, provided by IRsweep GmbH, project leader, has been a success and is actually available on the market as a product. Through direct cooperation with the receiver of detection modules, VIGO S.A. was able to iteratively develop the best solution for the PETRA analyser. As a result, the detection module with unique parameters, in addition to being an analyser component, has become part of our company's portfolio and has been introduced to the market as a new product.

What are the results of the project?

The result of the project is a technology of detection modules with an integrated electronic



Detector module developed at VIGO System SA.

detector in a hermetic housing. These are detection modules dedicated to the petrochemical analyser developed by a foreign partner IRsweep GmbH (a part of the international PETRA project). Additionally, a detection module with a band of G 1 GHz for analogous and other applications has been deployed into production, became part of the VIGO S.A. portfolio and, as a new product, has been introduced to the market. In addition, we have been able to strengthen cooperation with foreign partners, which resulted in the implementation of another project financed under the EUROSTARS programme, the ACCORDS project – “Coherent Dispersion Spectrometer” implemented with Alpes Lasers SA.

What are your plans for the future?

We are going to continue our cooperation with foreign partners under the same proven conditions, which are beneficial for both sides us and our partners. We also intend to apply for international programmes. In the nearest future, we will be applying for the EUREKA initiative and the Horizon 2020 programmes, and further into the future certainly for other programmes on an international scale.



60+SHOE – A SHOE WITH A SELF-LOCKING SYSTEM FOR THE ELDERLY



Basic info:

- beneficiary: Polish Chamber of Shoe and Leather Industry (PIPS)
- programme: CORNET: Collective Research NETworking
- project title: Development of a holistic footwear concept based on user-centred design and integrated self-management tools for elderly (60+) – 60+SHOE
- project duration: 01.01.2017 – 31.12.2018
- value of the project: EUR 505 430
- project partners: Prüf- und Forschungsinstitut Pirmasens e.V. (The Test and Research Institute Pirmasens – PFI), Germany
- respondent: Marek Górecki/Izabela Pospiech, Bogusław Woźniak PhD

How have you established cooperation with foreign partners?

Bogusław Woźniak, PhD, vice-president of the Polish Chamber of Shoe and Leather Industry (PIPS), has extensive network of contacts both among entrepreneurs and scientific units from Poland and abroad. As a representative of a Chamber participated in numerous trade shows and international conferences representing the footwear industry. At one of such events he met Mr Peter Schultheis MSc. who represented the Test and Research Institute Pirmasens – PFI, a research unit acting for the footwear industry in Germany.

Is it worth it to implement international projects with institutions from Poland?

International cooperation is very important not only for the scientific progress but also in the economic and social aspect. The Polish Chamber

of Shoe and Leather Industry together with the Institute of Leather Industry, a research performer, successfully completed the second project financed under the CORNET Initiative; it also implements projects in the ERASMUS programme. We have around 6000 footwear manufacturers in Poland producing more than 40 million pairs of shoes per year, which puts our country in fifth place in Europe in terms of production. The barrier to the rapid development of this sector may be large fragmentation; however, these problems are faced by organisations associating entrepreneurs and acting on their behalf such as Polish Chamber of Shoe and Leather Industry (PIPS). So despite the small staffing but with a very large economic potential, the chamber perfectly deals with the implementation of projects aimed at developing innovative solutions. The implementation of projects together with entrepreneurs also highlights the advantages of joint actions and encourages entrepreneurs to take joint, ambitious initiatives.

What kind of benefits have you gained from the implementation of an international project?

The main benefit of the project was the establishment of long-term cooperation. Both in matters related to applying for further projects funding and in other matters related to the footwear industry, such as the import of cheap footwear from Eastern countries or work on rules and standards for specific types of footwear. Another benefit is building own brand not only in the country but also on the international arena. International cooperation enables the promotion of the Polish footwear industry and its possibilities of introducing innovative technologies. The Polish Chamber of Shoe and Leather Industry (PIPS) is an association

of footwear sector entrepreneurs, so international cooperation brings immeasurable benefits not only to the Chamber, but also to entrepreneurs.

What are the results of the project?

The result of the project is a model of innovative footwear optimised for the needs of a 60+ user group equipped with a remotely controlled self-locking system. The model was also verified in terms of the possibility of production and distribution on the Polish and foreign markets. The results of the project also have an indirect impact on enterprises, especially the SME sector, because they give them the opportunity to expand their offer with new products addressed to people from the 60+ age group. The result is also enabling a significant improvement of the quality of elderly people's lives. The development of footwear dedicated specifically for this age group takes into account the specific needs and constraints of 60+ consumers. As of yet, products of this kind have not been introduced on the footwear market to such a large extent taking into account the needs and limitations of this group.

What are your plans for the future?

Both PIPS and PFI specialise in footwear-related matters, which is why we are intending to continue our cooperation in this field. The footwear area does not only comprise materials and technologies for the production of footwear but also concerns issues related to children's footwear or for selected groups such as: 60+ people, athletes, uniformed services. There is a lot of subject-related application possibilities and we plan to continue the implementation of further international projects.



Meeting with coordinator
(from left) Bogusław Woźniak (IPS/PIPS), Marek Górecki (PIPS), Peter Schultheis (PFI), Rony Weis (PFI).



Meeting with coordinator,
(from left) Edyta Grzesiak (IPS), Marek Górecki (PIPS), Bogusław Woźniak (IPS/PIPS), Peter Schultheis (PFI), Rony Weis (PFI), Dorota Werner (PFI), Bożena Rajchel-Chyla (IPS), Robert Gajewski (IPS).

WISEGAN – A PROJECT WITH A JAPANESE NOBEL PRIZE WINNER



Basic info:

- beneficiary: Institute of High Pressure Physics (IHPP)
- programme: V4-Japan Joint Research Program
- project title: New generation of InGaN layers, quantum wells and wires grown on vicinal GaN substrates for optoelectronics and photovoltaics – WISEGaN
- project duration: 1.12.2015 – 30.11.2018
- value of the project: EUR 375 000
- project partners: Nagoya University, Japan, Charles University, Czech Republic
- respondent: Prof. Michal Leszczyński

How have you established cooperation with foreign partners?

Michał Leszczyński, WISEGaN project manager, came out with the idea of the project. The international partners of the project knew each other well, but without previously formalised collaboration. With Hiroshi Amano from Nagoya University, the 2014 Nobel Prize winner, we had met at least a dozen times during conferences on nitride semiconductors and epitaxy. With Vaclav Holy, a Czech partner, we had known each other for over 30 years, as Michał Leszczyński's first area of scientific interest was X-ray diffraction, and this is the area of science in which Vaclav Holy is a global guru.

Is it worth it to implement international projects with institutions from Poland?

The Institute of High Pressure Physics is the largest academic laboratory in Europe dealing with nitride semiconductors. It has a number of unique technologies, which was a decisive factor that encouraged foreign partners to participate in the project. In Poland, there are several laboratories dealing with similar topics – extremely popular in the world due to the

markets worth multi-billion related to LED lighting, laser displays, as well as quantum technologies.

What kind of benefits have you gained from the implementation of an international project?

Joint research has led to a better understanding of the formation and elimination of defects in nitride semiconductors, which translates into better parameters of laser diodes manufactured by TopGaN Ltd, a spin-off company of the Institute of High Pressure Physics. On the one hand, we gained insight into the excellent organisation of scientific research in Japan, in particular research in the field of nitride semiconductors; on the other hand, we were provided access to the knowledge of outstanding scientists from Japan and the Czech Republic.

What are the results of the project?

As a result of the project, we were able to publish 5 joint publications. Project results were presented at numerous national and international conferences related to the subject of the project.

What are your plans for the future?

We continue cooperation with the Czech partner, implementing project funded under the National Science Centre, and a new application has been submitted together with German partners (the Beethoven project). We conduct joint research without a formal agreement with the Japanese partner. If there is a chance to continue the V4-Japan project, we will apply for such a project. Hiroshi Amano considered our joint publication on WiseGaN results as a milestone on the road towards multi-coloured emitters.



PRODUCTIVE4.0 – OVER 100 PARTNERS FROM 19 COUNTRIES

Basic info:

- beneficiary: DAC S.A.
- programme: ECSEL Joint Undertaking
- project title: Productive4.0. Electronics and ICT as enabler for digital industry and optimised supply chain management covering the entire product lifecycle
- project duration: 1.05.2017 – 30.04.2020
- value of the project: EUR 105 840 614.85
- project partners: i.a. Infineon AG (Germany), BMW (Germany), Thales (France), Bosch (Germany), Philips (The Netherlands), NXP (The Netherlands), Volvo (Sweden), Danobat (Spain), ABB (Germany), ST Microelectronics (France), Ericsson (Sweden)
- respondent: Mateusz Bonecki PhD

How have you established cooperation with foreign partners?

The initiator and coordinator of the Productive4.0 project is Infineon AG, a German semiconductor manufacturer. Productive4.0 is one of the largest Horizon 2020 projects dedicated to the digitisation of industry. It is a response of the European electronic and IT sector to the challenges identified in the Digitising European Industry strategy, primarily in the context of technology platforms and pilot lines. Infineon AG has consolidated a consortium of key European industry actors, bringing together 108 partners from 19 European countries. DAC S.A. competences in the field of digitisation of the value chain, logistics and transport proved to meet the needs of project participants. The DAC received an invitation to the consortium as a partner who had the opportunity to implement joint projects with

certain consortium members in the past.

Is it worth it to implement international projects with institutions from Poland?

DAC company has already proven itself as an international supplier and integrator of systems and solutions for transport, fleet or supply management, using IoT for and real-time load monitoring, data analytics run on edge devices or optimisation algorithms supporting the planning of logistics processes. The types of activities characteristic of Horizon 2020, such as Innovation Action (IA), are always focused on bringing innovation to the market and, therefore, on commercialisation. Research results must, on the one hand, fit into the context and objectives of the project, and on the other hand – they must find practical application, and thus must be aligned with the needs of market. The potential of Polish entities to implement this kind of projects translates into what position they can take in the value chain. European “collaborative” projects, with the participation of industry and science, are a long-term opportunity for Polish entities to prove themselves in the structures of the single

The BMW GROUP's flying drone "Intrafly" for Container Monitoring. Source: BMW GROUP.



Productive 4.0

market. Repeatedly functioning on the European or global market is the first step to further experimenting in the area of R&D with foreign partners with financial public support.

What kind of benefits have you gained from the implementation of an international project?

The benefits of experimenting in the living value chain offered by Productive4.0 are key to the company's development. In the project, we found partners, potential recipients with whom we worked on requirements for our technological solutions, but also suppliers. We have started cooperation with companies such as Infineon or NXP in the field of reliable start-up environments compatible with TPM standards and the use of Secure Element integrated circuits in the construction of trusted IoT devices. Together with the Dutch branch of the French company Thales, best known for contracts for the defence sector, we have implemented an architecture that allows – with a restrictive approach to privacy and data ownership – to exchange configuration data of complex systems between participants of the entire supply chain appropriate for a given system.

What are the results of the project?

The DAC team has created i.a. prototype of a secure one-chip computer with a built-in Secure Element, acting as a trusted gateway in the IoT architecture, used to integrate wireless on-board sensors and to communicate with the Internet. In the future this type of solutions will form the basis for all systems that guarantee cyber security or the so-called end-to-end chain of trust. Among the results of other project partners we will find reference implementations of 3D printer farms, the use of drones in production line logistics (BMW) and a simulated environment in which robots learn behaviour in unusual situations (ABB) and many others. Implementations performed in the project include the automotive, chemical, energy, electronic, machine industry, production of consumer goods, logistics and transport.

What are your plans for the future?

The prototypes created in Productive4.0 project gave an opportunity for DAC S.A. to join other consortia. We are currently implementing the Customer Development process with companies from the transport and logistics sector in Poland. The goal is to use our IoT gateway in the transport and logistics sector to guarantee confidence in data sources which will be the basis for monitoring and accounting for logistics operations under the so-called smart contracts based on blockchain technology.

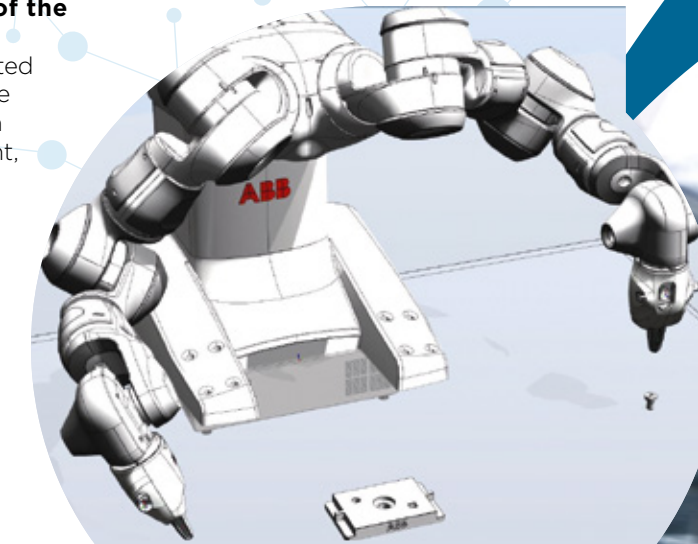


ABB RobotStudio providing an environment to model and simulate robot stations. Source: ABB.



The BMW GROUP's Smart Transport Robot for automated commissioning of sequence racks. Source: BMW GROUP.

SANO — CENTRE FOR EXCELLENCE AND NEW METHODS OF MEDICAL DIAGNOSIS



Basic info:

- beneficiary: Academic Computer Centre Cyfronet AGH
- Programme: Teaming for Excellence
- project title: Sano: Centre for Computational Personalised Medicine – International Research Foundation
- project duration: 01.08.2019 - 30.07.2026
- value of the project: EUR 15 000 000
- project partners: Klaster LifeScience Kraków, Poland, University of Sheffield, Great Britain, Insigneo Institute, Great Britain, Forschungszentrum Jülich, Germany, Fraunhofer Institute for Systems and Innovation Research ISI, Germany, National Centre for Research and Development, Poland
- respondent: Marian Bubak DSc

Owing to a unique initiative carried out by the Cyfronet AGH Academic Computing Centre along with five partner institutions in the framework of the EU Horizon 2020 Teaming for Excellence programme, a new entity called Sano – Centre for Computational Personalised Medicine will be established. This international research foundation is one of three Polish beneficiaries of the prestigious Teaming for Excellence Phase 2 call, as well as the only participant representing the Lesser Poland region.

The mission of Sano is:

- development of new computational methods, algorithms, models and technologies for personalised medicine,
- introducing new diagnostic and therapeutic solutions based on computerised simulations into clinical practice,
- fostering creation and growth of enterprises which develop cutting-edge diagnostic and therapeutic technologies,
- contributing to novel training and education curricula which meet the needs of modern personalised medicine.

The Sano Centre will be situated in Kraków: a city well known for educating top-class medical practitioners and IT experts, whose teaching hospitals are well regarded among the academic community and whose life science technology sector is continually expanding.

The establishment of the Sano Centre will directly contribute to regional scientific excellence by fostering new research collaborations and creating top-tier educational opportunities for postgraduate students. It will also improve knowledge and technology transfer by promoting creation of new commercial enterprises which deal with advanced technologies. The Centre's impact will transcend regional boundaries, contributing to advancements in medical research and thereby to the quality of medical care.

The Centre's objectives are based, among others, on the National Smart Specialisation Strategy. Sano aims to enhance collaboration between academic and commercial institutions on an international scale. Key performance indicators will include a number of highly cited scientific publications, patents and grants obtained by the Centre, the number of solutions based on computational models which have been introduced into clinical practice, and the number of innovative marketable products and services.



Team of Marian Bubak, scientific koordynator of Sano project, in front of the fastest Polish supercomputer located in Academic Computer Centre Cyfronet AGH. Photo: One HD/ FNP archive.

ZINCPower — INTERNATIONAL RESEARCH FOR ANTICORROSIVE INDUSTRY



Małgorzata Zubielewicz



Agnieszka Królikowska

Basic info:

- beneficiary: Polish Corrosion Society
- Programme: CORNET – collective research networking
- project title: New generation of zinc primers with improved anticorrosion, application and ecological properties – ZincPower
- project duration: 01.07.2017 – 31.08.2019
- value of the project: EUR 558 590
- project partners: Forschungsgesellschaft für Pigmente und Lacke e.V. (FPL) Germany, Fraunhofer Institute for Manufacturing Engineering and Automation IPA, Germany, Research Network ŁUKASIEWICZ – Institute for Engineering of Polymer Materials and Dyes, Poland, Road and Bridge Research Institute, Poland
- respondents: Małgorzata Zubielewicz DSc Eng. (SBŁ IMPIB), Agnieszka Królikowska DSc Eng. (IBDiM)

How have you established cooperation with foreign partners?

The IPA Institute was the originator of the project and the decision to apply was made at one of the partner's meeting. Together with IPA we have implemented two different project funded under CORNET Initiative. Implementation of joint projects in a consortium consisting of a German institute and two Polish institutes (Institute for Engineering of Polymer Materials and Dyes IMPIB and the Road and Bridge Research Institute) was the result of previous cooperation between with Forschungsinstitut für Pigmente und Lacke e.V. (IPA).

Is it worth it to implement international projects with institutions from Poland?

Research carried out within the framework of the project is performed in two national institutes. Both institutes examine corrosion and corrosion protection mechanisms, as well as the influence of the composition of paint products on the properties of coatings. They have qualified staff in both basic research as well as experience in practical applications and field works, and lead long-term cooperation with small and medium enterprises producing anticorrosive agents. For years, they have been participating in national and international projects in the anti-corrosion industry (EURECA I, INNOTECH, LIFETIME, SCOUT, ARCHES, COST, etc.). All three institutes (Polish and German) complement each other in terms of knowledge, experience and equipment, so it is very beneficial to carry out joint research within the framework of international projects.

What kind of benefits have you gained from the implementation of an international project?

International cooperation makes it possible to gain a better understanding of the subjects covered by joint projects, for example thanks to the possibility of using the different research methods in which the individual Institutes specialise. For young scientists, international cooperation is an opportunity not only to become familiar with new equipment or methodology, but also to establish valuable personal contacts. Scientific discussions between scientists with different experience is particularly important. It allows for a critical approach to issues, "generates" new research ideas and leads to a further expansion of cooperation. Another great benefit is getting to know the representatives of supporting companies from other countries, discovering their achievements, the way they operate and liaising our supporting companies

with partner companies. This very often leads to even more cooperation.

What are the results of the project?

The ZincPower project resulted in the development of anticorrosive primers containing less than half the amount of zinc pigments than in conventional, commonly used high zinc primers, with better anticorrosive properties and better resistance to mechanical damage. This solution is the subject of patent application No. P. 428816 titled Epoxy two-component anti-corrosion paint. Results has been also appreciated with bronze medal at the International INTARG 2018 Fair in Katowice, a silver medal and a special prize from the Taiwanese Inventors League at the iENA fair 2018 in Nuremberg, a silver medal and the Nicola Tesla Prize from the Serbian Association of Inventors at the Global Invention Forum 2019 in Limassol.

What are your plans for the future?

We intend to continue our cooperation with German partners in the field of corrosion protection. Due to the fact that one of the directions of paint development is the improvement of its protective, functional and ecological properties, in the next project we intend to conduct research on incorporating combined pigments with an active and insulating mechanism of action into anti-corrosive primers. Together with IPA, we applied for funding in CORNET recent call for proposals. Each of our Institutes also has different research contacts that help us meet new partners and discover new research projects, applying together in Horizon 2020.



Photo of the Helgoland quay in Germany, where the samples are made - the photo shows their exposure in natural conditions.



ROOIBOS – POLISH -SOUTH AFRICAN RESEARCH ON COMPOSITION OF ROOIBOS TEA INFUSION

Basic info:

- beneficiary: University of Silesia in Katowice
- programme: NCBR and NRF Joint Research Programme
- project title: Analysis of chromatographic signals and kinetics of exchanging the composition of phenolic compounds in the fermentation process of rooibos tea (ROOIBOS)
- project duration: 01.04.2016 - 31.03.2019
- value of the project: EUR 68 618
- project partners: Agricultural Research Council (ARC), Republic of South Africa; Stellenbosch University, Republic of South Africa
- respondent: Prof. Beata Walczak DSc hab.

How have you established cooperation with foreign partners?

We established cooperation with a research group from the Republic of South Africa in 2011 thanks to a meeting which took place a year earlier at a joint conference in Morocco. The team from South Africa visited Poland for the first time in May 2012 and since then our systematic scientific cooperation has been dated. Before the project started, it resulted in several joint publications in prestigious scientific journals. The initiator of the ROOIBOS project was the South African side. Based on the effects of initial cooperation, preceding the start of formal bilateral cooperation with our partner from South Africa, we have learned about the high scientific competence of the South African team, their reliability in meeting agreed deadlines, high quality results obtained, and a very friendly climate in which there were arrangements at all stages of joint research.

Is it worth it to implement international projects with institutions from Poland?

For years our research group has been dealing with data analysis (chemometrics) which does not require any equipment facilities, just an appropriate computer. This fact is very important, because the lack of financial limitations allows us to implement any research projects at a global level. The group from South Africa decided to establish cooperation with our research group due to the scope of our scientific activity and, above all, our current achievements.

What kind of benefits have you gained from the implementation of an international project?

The international cooperation has enabled Polish students to improve their language skills, familiarise themselves with the research topics of the foreign centre, enhance the level of scientific cooperation skills through participation in an international research group, as well as implement interdisciplinary scientific subjects. An additional benefit was the opportunity to participate in international symposia and conferences.

What are the results of the project?

As part of the project, four joint scientific articles were published in renowned scientific journals such as Journal of Chromatography A, Analytica Chimica Acta and Food Research International. A chapter has also been written for Comprehensive Chemometrics, 2nd Edition, Elsevier. The results obtained as part of the project were presented at nine prestigious international scientific conferences and four national conferences. One student from South

Africa and two students from Poland completed master's theses based on the results of scientific research carried out in the project. The effects of the work of Polish students have been appreciated, among others in the competition for the best poster during one of the conferences and in the competition for the best master's thesis at the Institute of Chemistry of the University of Silesia in the academic year 2017/2018.

What are your plans for the future?

Thanks to fruitful cooperation during the first edition of the call for proposals and the perspective of expanding cooperation, both sides of the project expressed their willingness to apply to the second call within the NCBR and NRF Joint Research Programme. We are currently implementing another joint Polish-South African research project funded by the National Centre for Research and Development.



Inauguration of project, visit of guests from South Africa in Katowice, czerwiec 2016 r. Od lewej: prof. Dalene de Beer, Agricultural Research Council, Paul Williams oraz Jade Tobin, Stellenbosch University.

PLANT-ALZH – POLISH-TURKISH COOPERATION IN ALZHEIMER DISEASE TREATMENT

Basic info:

- beneficiary: Medical University of Lublin
- programme: Polish-Turkish/Turkish-Polish Call for Proposals (NCBR – TUBITAK)
- project title: Discovery of new natural compounds for the treatment of Alzheimer's disease (PLANT-ALZH)
- project duration: 1.04.2016 - 30.09.2018
- value of the project: EUR 322 500
- project partners: Acibadem University, Istanbul, Turkey
- respondent: Tomasz Mroczek Pharm.D.

How have you established cooperation with foreign partners?

The idea of a joint project came from the Turkish coordinator, Mr. Ahmet Tarik Baykal, who at one of the scientific websites found information about photochemical research conducted by me and my team at the Medical University in Lublin. Together we tried to combine our experience in the field of isolation and bioactivity of natural compounds found in plants with biological research on the mechanism and pathomechanism of Alzheimer's disease which is carried out by the Turkish partners. Our research was fully complementary, which ensured achieving significant scientific results.



Visit to Acibadem University in Istanbul, from left: Tomasz Mroczek (project coordinator) and Jarosław Widelski.

Is it worth it to implement international projects with institutions from Poland?

The Medical University of Lublin is one of the leading Polish and European institutions where research is carried out in the field of phytochemistry, isolation of natural compounds and studies of the biological activity of compounds found in the plant world. We have a well-equipped laboratory and highly qualified scientific staff. Our considerable scientific potential has encouraged the Turkish side to apply for a joint grant with us. In the field of phytochemistry, we have several good and very good research centres in Poland that carry out research at the international level.

What kind of benefits have you gained from the implementation of an international project?

First of all, we have found a research centre in Turkey which conducts biological research in the field of Alzheimer's disease at a global level, which will pay off for years, common projects, publications and patents. In addition, during our bilateral visits we had the opportunity to learn about the culture and customs of the residents of Istanbul,



Laboratory visit in Acibadem University.

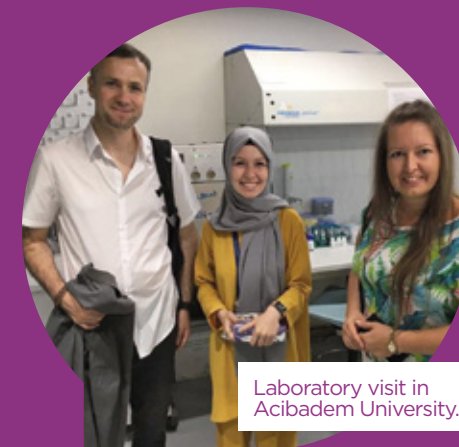
and our Turkish partner about ours, Polish customs. This is always conducive to ensuring a good climate of cooperation and reducing cultural barriers.

What are the results of the project?

I think that, given such a short period of project implementation (3 years), the output is quite impressive: 6 publications have already been published in the journals from the so-called Philadelphia list, and several more are being published due to extensive biological research. There are also patents and numerous lectures and poster reports at international scientific conferences. What is very important, we have identified compounds that could hopefully be applied in the therapy of Alzheimer's disease.

What are your plans for the future?

We plan to continue research with our Turkish partners. We would like to prepare another bilateral project which will allow us to take a step further towards clinical trials on selected compounds that could be used in the therapy of Alzheimer's disease. We are also thinking about a large project funded from the European Union funds.



Laboratory visit in Acibadem University.

CPOICNT – POLISH-TAIWANESE RESEARCH ON A NEW TYPE OF FUEL CELLS

Basic info:

- beneficiary: Institute of Physical Chemistry of Polish Academy of Sciences
- programme: Polish-Taiwanese cooperation
- project title: Palladium Based Anode Catalysts Supported on Conducting Polymer/Multiwalled Carbon Nanotubes Composites for applications in Direct Formic Acid Fuel Cells
- project duration: 1.01.2014 – 30.04.2017
- value of the project: PLN 376 393.00
- partners: Tatung University, Taiwan
- project supervisor/respondent: Andrzej Borodziński DSc Eng., Professor of ICHF

How have you established cooperation with foreign partners?

The project was the result of previous international cooperation in the field of fuel cells between partners from the Institute of Physical Chemistry and the Tatung University within three Polish-Taiwanese Joint Research Projects carried out under the Agreement on Scientific Cooperation between the Polish Academy of Sciences and the National Science Council in Taipei.

Is it worth it to implement international projects with institutions from Poland?

The Institute of Physical Chemistry has specialists from a very wide spectrum of physicochemistry area and a number of specialised, well-equipped units. One of the main reasons for establishing cooperation was the complementarity of both teams. An additional reason for Tatung University's interest in working with our unit was to propose a new research topic for fuel cells powered with formic acid. The potential of Polish entities in the area of our operations to implement international projects is in my opinion very high.

What kind of benefits have you gained from the implementation of an international project?

The project requires access to various non-standard research equipment and expertise. International cooperation ensured complementarity of the conducted research. Both sides represent different skills in the implementation of this project.

What are the results of the project?

Two methods of synthesis of highly active Pd / MWCNT anodic catalysts have been developed: (I) deposition using high-energy X-rays and (II) electrochemical deposition. On the first of these methods, the Polish and Taiwanese sides obtained the joint patent No. P.421987. Four joint papers were published and six presentations at international conferences were presented.

What are your plans for the future?

We are currently focusing on the implementation of another joint project funded under Polish-Taiwanese cooperation, which we started in 2019. Based on the obtained results, we intend to apply to international or national programs for the implementation of the developed power supply for portable electrical devices.



Project team.

AWAKE-2 – POLISH-NORWEGIAN RESEARCH ON GLACIERS

Basic info:

- beneficiary: The Institute of Oceanology of the Polish Academy of Sciences (IO PAN)
- programme: Polish-Norwegian Research Programme, CORE 2012 Call
- project title: Arctic climate system study of ocean, sea ice and glaciers interactions in Svalbard area – AWAKE-2
- project duration: 01.05.2013- 31.12.2016
- value of the project: PLN 4 056 284
- project partners: Nansen Environmental and Remote Sensing Center – Norway, Norwegian Polar Institute – Norway, The Norwegian Meteorological Institute (met.no) – Norway, The University Centre In Svalbard – Norway, The Nicolaus Copernicus University in Toruń – Poland, University of Silesia in Katowice – Poland, The Institute of Geophysics, Polish Academy of Sciences – Poland
- respondent: Waldemar Walczowski DSc, Professor of IOPAN

How have you established cooperation with foreign partners?

The Institute of Oceanology of the Polish Academy of Sciences for years has been conducting oceanographic research in the Nordic Seas and in the fjords of West Spitsbergen. Collaborating in international projects dedicated to the study of these water bodies and participating in international organisations and working groups we have established contacts with Norwegian oceanographers, from Nansen Environmental and Remote Sensing Center (NERSC), Norwegian Polar Institute (NPI) and The University Center In Svalbard (UNIS), with whom we have finally accomplished the AWAKE-2 project. The AWAKE-2 project was a continuation of successful cooperation in the AWAKE project initiated by the Institute of Oceanology of the Polish

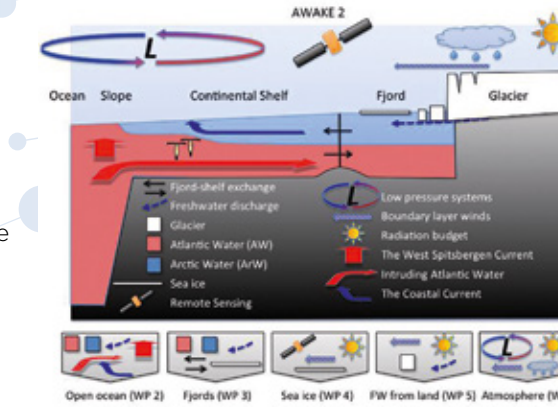
Academy of Sciences and both were financed from the NCBR funds as part of the Polish-Norwegian Research Programme.

Is it worth it to implement international projects with institutions from Poland?

The Institute of Oceanology is currently the only Polish scientific unit conducting systematic oceanographic research in the open ocean. The research vessel of the Institute r/v Oceania performs a cruise every year as a part of ARES's long-term scientific programme. Oceanographic data collected for years on the same measurement grid is a valuable data time series describing changes in the physical and biochemical environment occurring in the European Arctic. These data, own ship and recognisable, known researchers in the world, make us a valuable partner in international research projects. The potential of Polish entities to implement international projects, when it comes to land operations in the Arctic and Antarctic, is good. Both The Stanisław Siedlecki Polish Polar Station in Hornsund (Arctic) and Arctowski Polish Antarctic Station received funding for the modernisation and strengthening of scientific potential.

What kind of benefits have you gained from the implementation of an international project?

International cooperation is the basis for conducting modern science. I cannot imagine research, especially in the field of Earth Sciences, without intensive cooperation and exchange of experience between institutions and researchers from different countries.



Graphics, author Frank Nilsen, Diagram of the interaction between the ocean, atmosphere and tidal glaciers.

This allows for the exchange of people, experience, equipment, joint use of research infrastructure (e.g. ships). Such exchange always has an added value. What counts the most is not only cooperation between institutions, but also interpersonal relationships established during joint research.

What are the results of the project?

The main objective of the project was to determine the impact of the ocean and changes on tidal glaciers in the Svalbard fjords. The Hornsund Fjord acted as a laboratory to conduct this research. The project confirmed the important role of ocean warming in accelerating the withdrawal of glaciers ending in the sea. The result of the project is over 30 peer-reviewed publications in international journals, 3 PhD theses, over 80 conference speeches and even a geographical discovery. It was shown that after the horn glacier had completely melted, in the east of the Hornsund fjord, the passage between the western and eastern sides of Spitsbergen would open.

What are your plans for the future?

Despite the end of the project, we are in permanent contact with Norwegian oceanographers. We plan to submit a proposal to the next edition of the Polish-Norwegian Research Programme. It will be a continuation of the AWAKE-2 project. We are going to use the discoveries made in this project – opening the passage between the west and east side of Spitsbergen. With Norwegian partners we also plan to submit proposal about South Baltic research.

GLOBE — POLISH-NORWEGIAN RESEARCH ON BEARS



Basic info:

- beneficiary: Institute of Nature Conservation Polish Academy of Sciences
- programme: Polish-Norwegian Research Programme, CORE 2012 Call
- project title: GLOBE - Global climate change and its impact on brown bear populations: Predicting trends and identifying management priorities
- project duration: 01.12.2013 - 01.03.2017
- value of the project: PLN 3 958 155
- project partners: Norwegian University of Life Sciences NMBU; Norway, University College of Southeast Norway USN; Norway, Norwegian Institute for Nature Research NINA; Norway, Warsaw Ecological Economics Center, University of Warsaw WOEI; Poland
- respondent: Nuria Selva Fernandez DSc, Professor of IOP PAN

How have you established cooperation with foreign partners?

We did not work together before, but we and the Norwegian colleagues already knew each other. So, when the opportunity arose with the Polish-Norwegian Research Programme, I contacted them and proposed the idea for the project. I heard about the CORE 2012 Call from my colleagues at the Institute of Oceanology, Polish Academy of Sciences.

Is it worth it to implement international projects with institutions from Poland?

Definitely! In science, most important are ideas and, in my opinion, Polish institutions are plenty of researchers with great ideas and high motivation. These are the main strengths of my institution, the Institute of Nature Conservation

Polish Academy of Sciences, together with a wide experience in international scientific collaborations. Our Norwegian colleagues recognised the quality and innovativeness of the research we proposed them as well as of the potential and capabilities of the research team to achieve the established goals. This, together with the opportunity to obtain proper funding, motivated their decision to apply for the joint project and start working together.

What kind of benefits have you gained from the implementation of an international project?

GLOBE Project has succeeded in establishing a solid cooperation among the Polish and Norwegian partners. By conducting comparative studies in both countries, we have achieved a broader perspective and have made the outputs more interesting and of greater scientific value. GLOBE has also integrated various areas of expertise of the researchers involved through close collaboration at all the stages of the project, from planning and data gathering, to data analyses and interpretation of results. This has clearly enriched the outcomes and the quality of the publications, as well as promoted shared learning and strengthened the research capacity of all partners.

What are the results of the project?

Climate change and human-driven changes in the habitat are among the main threats to biodiversity, especially in boreal and alpine regions. Brown bear, the largest terrestrial carnivore in Europe and a generalist species of a wide trophic and climatic niche, was chosen as a model species and indicator of ongoing climate and environmental changes. GLOBE has



Researchers of the GLOBE Project during one of the meetings, held in Zakopane, Tatra Mountains, Poland.

filled an important gap by providing scientific evidence of climate and human-induced changes in the winter, foraging and stress ecology of the species, as well as in human-bear relations. Our findings have contributed not only to increased knowledge on the ecology and conservation of the species, but also to better understanding of the mechanisms of species' adaptation to global changes. The output of GLOBE included 34 scientific publications, 23 databases, 4 reports and numerous popular articles and stories about project results covered by various media.

What are your plans for the future?

I have already applied for a joint project with German partners under programme initiated by the Max Planck Society, jointly managed with the National Science Centre in Poland. I am also considering applying jointly with the Norwegian and other international partners to EU-funded projects, such as BiodivERSA and Marie Skłodowska-Curie Actions.



Nuria Selva, Principal Investigator of the GLOBE Project, in the field. Photo by Adam Wajrak.



A female brown bear with her young in the Tatra Mountains, one of the main reproductive areas of the species in Poland. Photo by Adam Wajrak.



Bears feed intensively on berries during autumn in order to store energy reserves before wintering. Assessing climate and human-induced changes on brown bear foraging patterns and availability of bear foods was one of the goals of the GLOBE Project. Photo by Adam Wajrak.



E-QUALY – POLISH-NORWEGIAN RESEARCH ON PREVENTION OF COLON CANCER

Basic info:

- beneficiary: The Maria Skłodowska-Curie Memorial Cancer Centre and Institute of Oncology in Warsaw
- programme: Polish-Norwegian Research Programme, CORE 2012 Call
- project title: E-QUALY: Polish-Norwegian project on the effectiveness and electronic quality assurance in endoscopy screening for colorectal cancer
- project duration: 01.08.2013 – 31.01.2017
- value of the project: PLN 2 629 500.00 (€ 640 810)
- project partners: University of Oslo, Norway
- respondent: Prof. Jarosław Reguła, MD PhD

How have you established cooperation with foreign partners?

The project was the result of previous collaboration involving the design and implementation of one of the largest randomised population-based studies in the field of colon cancer prevention (NordICC project – The Nordic-European Initiative on Colorectal Cancer). The E-QUALY project was a direct continuation of previous cooperation. The initiator of the project submission was Prof. Jarosław Reguła and Prof. Michał F. Kamiński from the Oncology Center – Institute in Warsaw. Both have previously played a key role in the NordICC project, and the E-QUALY project includes the initial observation period of the NordICC project.

Is it worth it to implement international projects with institutions from Poland?

Our institution has a great research potential in the field of colon cancer prevention and colonoscopy quality. We are one of the key

global teams conducting and publishing research in those areas. In addition to the potential associated with human resources, we are also responsible for conducting the National Screening Programme for Colon Cancer, which provides excellent opportunities to analyse the Polish population.

What kind of benefits have you gained from the implementation of an international project?

The E-QUALY project has allowed to strengthen the significance of both the Polish and Norwegian teams on the international arena thanks to the publications written as part of the project. In addition, thanks to the creation of a platform for the digital collection of feedback from patients participating in the National Screening Programme for Colon Cancer, we have improved the possibilities of data collection and presented a modern solution in the field of screening and colonoscopy.

What are the results of the project?

The results of the project have been published in prestigious scientific journals. The most important results were the exact description of the initial population and data on the quality of the colonoscopy in the NordICC study and a thorough statistical analysis of risk factors for colonoscopy pain. In addition, as part of the project, European guidelines on the quality of colonoscopy have been published. In addition to publications, as part of the project, we have created a digital feedback system for patients undergoing colonoscopy. The system was implemented in Poland in 2017 and is used as part of routine practice.

What are your plans for the future?

Our teams have planned cooperation for the next several years in the field of colon cancer prevention. First of all, the results of the NordICC study will be analysed over the next 5 years. Secondly, we are currently co-conducting a large, randomised study in dozens of centres across Europe (EPOS – European Polyp Surveillance Studies). The purpose of this study is to establish optimal surveillance rules after removal of colon polyps. The research is currently in the recruitment phase and the whole project is planned for a minimum of 12 years ahead.



LEO – POLISH-NORWEGIAN RESEARCH ON LOW EMISSION OPTIMISED TYRES

Basic info:

- beneficiary: Gdansk University of Technology
- programme: Polish-Norwegian Research Programme, CORE 2012 Call
- project title: Low Emission Optimised tyres and road surfaces for electric and hybrid vehicles –LEO
- project duration: 01.05.2013 – 31.10.2016
- value of the project: PLN 2 247 344 PLN (€ 547 678)
- project partners: SINTEF, Norway
- respondent: Prof. Jerzy Ejsmont DSc Eng.

How have you established cooperation with foreign partners?

While working on other international projects, we have established a partnership with SINTEF, from whom we received an offer for joint submission of project proposal under the Polish-Norwegian Research Programme – CORE 2012 Call. The cooperation with SINTEF in the field of noise testing of car tires has always been fruitful, so the offer has been accepted and a research proposal for the LEO project was prepared.

Is it worth it to implement international projects with institutions from Poland?

About 95% of research projects of the Motor Vehicles Team of the Gdansk University of Technology are carried out with foreign partners as part of international projects or contracts for R&D work. We have permanent partners in Sweden, Denmark, the Netherlands, Switzerland, France, Norway, Germany, Austria, Belgium, Slovenia and the USA. We occasionally cooperate with Great Britain, Italy, Finland and Hong Kong. Due to the fact that we have a monopolistic global position in the field of tire resistance

testing and key position in tire noise testing, our foreign partners establish contacts with us and propose cooperation. Our research trailer is the only device in the world that allows to quickly and accurately test the rolling resistance of tires on the road. The laboratory is equipped with running machines adapted to the testing of rolling resistance and tire noise, which is characterised by the fact that the tests can be carried out at a temperature of -15°C to + 35°C what distinguishes our laboratory on a global scale.

What kind of benefits have you gained from the implementation of an international project?

We believe that international cooperation contributes to a better use of our potential, and thus to its further development. Additionally we have the opportunity, as it was in the case of the LEO project, to familiarise ourselves with specific problems in the field of cooperation of tires with roadways that occur in countries with different climate and road surfaces. In the case of Norway, which is the leader in the number of electric cars, we had the opportunity to perform tests in real conditions, not in stimulated ones.

What are the results of the project?

By performing LEO project it has been proven that the use of low rolling resistance tires designed specifically for electric cars and road surfaces with reduced resistance for low- and medium-speed roads leads to significant energy savings without sacrificing noise reduction. The results of the project have been published and used to prepare following projects, including the project financed by the National Centre for Research and Development funded under the TECHMATSTRATEG national programme.

R2 Mk.2 test trailer for testing the rolling resistance of car tires during tests in the USA.



Interior of the thermal chamber with a running machine equipped with replicas of road surfaces.

What are your plans for the future?

We are discussing with SINTEF about the possibility of preparing another proposal, which could be submitted to the latest edition of the Polish-Norwegian research programme. The planned project will be dedicated to the issue of representativeness of research conducted in connection with the award of ecological labels that are required for car tires. It will not be a direct continuation of the LEO project, but the thematic area will be similar.



The National Centre
for Research and Development