



SCIENCE & TECHNOLOGY
CENTER IN UKRAINE

Science & Technology Center in Ukraine Annual Report 2010

For a Safer and Better World,
Supporting the Transition of Weapon
of Mass Destruction Research into
Peaceful Civilian Application

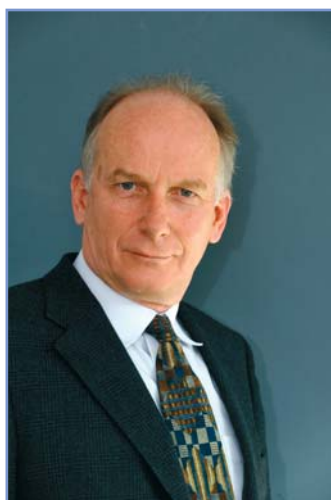


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as Parties to the Agreement Establishing the Science and Technology Center in Ukraine (STCU)

Statement from the Chair of the STCU Governing Board



Marcus Cornaro
Chair of the STCU Governing Board

The year 2010 marked STCU's 15th Anniversary. During the ceremonies, it has been underlined unanimously that the mission of the Centre has been successful in keeping sensitive scientific knowledge secured. STCU had a strong contribution to the consolidation of the bridges between the eastern and western scientific communities.

The transition phase started in 2009 has accelerated in 2010. Apart from the Ukrainian Government, the European management team changed as well. Nevertheless, the continuity of the engagement to support STCU both politically and financially, on one hand, and new ideas and vision for the future on another hand has materialised. New challenges have been launched for the Secretariat in order to enhance the financial efficiency of STCU, while new medium and long term objectives and the means to achieve them are to be agreed upon by the Governing Board. The year 2010 brought closer cooperation between the donors via regular teleconferences, boosting the activity of the Working Group on STCU future.

In the meantime, the core activity of STCU - support of the regular research projects – was implemented by the Parties, in line with their non-proliferation policies, allowing STCU to keep the momentum and the credibility build among the scientists. Although the funding of the Regular Projects continued to decline, the other activities of the Centre increased. The Partner Projects funding was among the highest ever in STCU's history, and the funding came mainly from Governmental Partners, indicating that the Parties are more and more interested in targeted and specific non-proliferation activities.



The Targeted Initiative programme kept building momentum. Firstly, this programme allows the partner countries to equally share the funding of the projects, increasing its impact, and proving increased interest and ownership over the projects. Secondly, it underlines the interest for more specific and programmatic activities of the Donors, and also for the more streamlined management and lower administrative burden.

The success marked by STCU over the last 15 years, as well as its positive image within the Governments and scientific communities of all its members, represents a solid basis to build its future. Although the imminent knowledge proliferation risks seem to be drastically reduced over the last 15 years, new challenges emerged. Therefore, all the partners are now involved in defining new challenges, new mandate and new strategies for the future. STCU has to define its role and its place among other initiatives and non-proliferation instruments. The balance between the private and the governmental funding has to be carefully tuned in order to allow the Centre and the recipient laboratories to be more sustainable, on one hand, and maintain the non-proliferation aspect as a priority, on another hand. After the economic crises, when the resources are still scarce, tax payers demand increased efficiency, reliability and flexibility. All these factors put pressure both on the Governing Board and the Secretariat to adapt the internal structure of the Centre to the new realities.

During this transition period, the Secretariat and STCU's management team is a reliable and helpful partner of discussions, therefore, in the name of the

Governing Board, I would like to thank every person that kept the Centre up and running, in particular to the Executive Director, the Deputy Executive Directors and the staff in Kiev and branch offices.

I would also like to express my gratitude on the behalf of the Governing Board to the scientists of Ukraine, Georgia, Moldova, Azerbaijan, Uzbekistan, as well as to the western scientific advisors that put their efforts and knowledge together towards peaceful purposes.

Marcus Cornaro
Chair of the STCU Governing Board

Statement from the STCU Executive Director



Andrew Hood
STCU Executive Director

In 2010, the STCU celebrated 15 years of operations, serving the program needs of the STCU Parties in pursuit of their WMD nonproliferation policy objectives. When the STCU held its 15th Anniversary event on 17 November 2010, the STCU had already surpassed \$200 million (USD equivalent) in approved project funding, had managed over 1,400 collaborative research projects involving approximately 18,000 scientists and technicians from the STCU's 5 recipient countries (with 10,000 of those recipients formerly involved in Soviet WMD programs).

Even so, these numbers do not paint a complete picture of the impact of STCU in Ukraine, Azerbaijan, Georgia, Moldova, and Uzbekistan. Through STCU projects and supplemental programs, thousands of scientists from hundreds of institutes have developed professional connections with their academic peers, and with S&T customers, in Canada, Europe and the United States. With STCU assistance, many institutes became more successful and self-sufficient; many commercial R&D partnerships were created through STCU activities; and STCU-provided experiences encouraged many individual scientists and national S&T leaders to think of new ways to reform and improve their nations' innovative scientific and technical capabilities, directly supporting their country's aspirations to modernize their economies and improve their civil societies.

The STCU Secretariat, itself, had a steady year of activity, having settled into the temporary headquarter offices in Kyiv and experiencing no disruptions to its operations. The Secretariat did see a continued re-



duction in its workload, as well as in its overall size. This trend is expected to continue over the next few years. Nevertheless, the Secretariat continued to explore new initiatives within the framework of its existing mandate and Governing Board instructions. The hope is that these initiatives, properly planned in conjunction with the Parties, will provide the threads that will develop into new program directions and new activities in the future.

The Secretariat reluctantly closed its Information Office in Tashkent (Uzbekistan) in June 2010, due to the end of active STCU operations in that country. The Secretariat remains hopeful that in the nearest time, STCU and Uzbekistan can renew active cooperation. The Secretariat also closed one of its three Ukrainian field offices—the Dnipropetrovsk office—when the Dnipropetrovsk Regional Officer left STCU and when the Secretariat vacated its office space there. Due to the Governing Board discussions on establishing a new strategic direction for STCU, and due to improvements in communication and other connections within Ukraine, the Secretariat recommended (and the Governing Board approved) that the STCU not pursue re-opening a Dnipropetrovsk field office for the foreseeable future.

New project funding in 2010 declined for the fourth consecutive year. Interestingly, the project funding decline was most acute in the Regular Project category, as the Funding Parties' nonproliferation priorities shifted toward more deliberate, targeted programmatic activities, and more emphasis given was to Funding Party/Recipient Party co-funded

Targeted Initiative projects and Partner Projects (especially, Governmental Partner Projects).

The Secretariat continued to develop its Nuclear Forensics Targeted Research Program, which thus far, has attracted \$1 million USD in Partner commitments from the U.S. National Nuclear Security Administration, Lawrence Livermore National Laboratory, and Defense Research and Development Canada (DRDC). Further, a new initiative in environmental forensics was proposed by Environmental Canada, and the Secretariat is working with the Parties to develop this initiative into a potentially new Targeted Research Program for STCU. Finally, the Secretariat continues to cooperate with the Ukrainian nuclear science authorities and EURATOM to conduct joint R&D in the nuclear field—yet another possible new Targeted Research Program opportunity.

The Secretariat continued supporting both Canadian and European initiatives in the biosafety/biosecurity area. In late 2010, the European Commission's Europe Aid Cooperation office and STCU agreed to pursue a 42 month/4 million EUR project to improve the biosafety/biosecurity of a Ukrainian biological research institute. The Secretariat also continued working on Canadian and U.S. – sponsored project and supplemental activities with other Ukrainian biological institutes, as well as with Georgian biological institutes.

At the request of STCU's sister center, the Interna-

tional Science and Technology Center (ISTC) in Moscow, STCU partnered with ISTC in responding to an invitation from the European INTAS program to compete for funds remaining from that terminated program. In June 2010, after a ISTC-STCU presentation of two Centers' proposals, the INTAS General Assembly jointly awarded approximately 1 million EUR to ISTC and STCU. STCU ultimately received about 530,000 EUR from INTAS, which the Secretariat will use for two activities in 2011: a co-funding Targeted R&D Initiative activity with the National Space Agency of Ukraine, and developmental support of an S&T technology management program at the National Technical University of Ukraine "Kyiv Polytechnic Institute".

The highly successful Targeted R&D Initiatives Program continued through its sixth year of project solicitations, approvals, and co-funding cycles between the STCU Funding Parties and the national S&T authorities of Azerbaijan, Georgia, Moldova, and Ukraine. Since the program's inception in 2005, over \$12 million (USD equivalent) in Targeted Initiative projects have been approved, with 50% of that total funding provided by the Recipient Parties and the remainder provided by the Funding Parties. Due to fiscal restraints on the part of the Funding Parties, the Targeted R&D Initiatives Program has not been able to expand beyond its current ceiling of annual pledged funding amounts (a combined total of approximately \$1.5 million USD from the Funding Parties). But thanks to its portion of the awarded of INTAS funds, STCU will be able to initiate a new (albeit limited) Targeted Initiative activity with the National Space

Agency of Ukraine (NSAU). Hopefully, this limited Targeted Initiative cycle may be the catalyst for attracting other sponsors and interested customers, and thus help to grow and expand the STCU-NSAU cooperative partnership.

Finally, the Partner Program continued to achieve above-average project funding levels in 2010, and it was the dominate category of new STCU project funding in this year. In fact, the approximately \$8.8 million (USD equivalent) in new Partner Project funding in 2010 was the third-highest annual total in STCU history. The amount of 2010 new Partner Project funding was almost double the combined 2010 amount of new Regular Projects and new Targeted Initiatives Projects.

However, within this Partner Program success is a trend worth noting. When the Partner Project funding is broken into its constitute parts, one can see that the vast majority of the 2010 Partner Project activity was funded by the Governmental Partners (\$6.2 million USD equivalent versus \$2.6 million in Non-Governmental Partners). Further, of the Governmental Partner Projects, nearly 62% came from one, single program: the Global Initiatives for Proliferation Prevention (GIPP) of the U.S. Department of Energy's National Nuclear Security Administration. In fact, at approximately \$3.86 million USD in new GIPP Partner Projects, the GIPP program was the largest single source of new project funding for STCU in all of 2010 (with the European Commission coming in second place with approximately \$2.3 million, USD equivalent).



In the past, the STCU Governing Board was approving a relatively stable amount of annual funding for new Regular Projects. However recently, the Funding Parties have been financing fewer Regular Projects; Regular Project funding has declined by half since 2006; and 2010 marked the first year in STCU's history that Partner Project expenditures exceeded Regular Project expenditures. Also, Targeted Initiative Projects (which require less administrative work than Regular or Partner Projects) accounted for more than 30% of all the new projects approved by the Governing Board in 2010. Furthermore, the increased share of Partner Projects is creating an administrative challenge for the Secretariat Management, insofar as annual levels of Partner Project activity are more variable and unpredictable than for Regular/Targeted Initiative Project activity.

The Funding Parties' shift in interest toward funding fewer-but-more-targeted projects, as well as toward Party-Directed Supplemental Budget activities, reflects the continuing evolution of STCU in reaction to the changing priorities of the Parties. Throughout 2010, the STCU Advisory Committee has been engaged in final discussions over new strategic directions for STCU. Although no final consensus had been reached in 2010, the outlines of agreement among the Parties were emerging. These outlines hint at a broad, transformative change in the STCU objectives and programmatic focus. Having set a self-imposed deadline of 2011, the Governing Parties and Secretariat are working hard to complete this long discussion about the STCU's future. The Secretariat is preparing itself for the changes to come, in terms of

programs, future budgets, and organization. Thus, after 15 years of successful activities, the STCU Secretariat now looks to 2011 and beyond—anticipating more years of service to the STCU Parties in security and stability enhancement through S&T-based activities.

Andrew Hood
STCU Executive Director

2010 Highlights and Accomplishments

S&T Commercialization Round Table

Under the STCU's Chief Technology Commercialization Officer Program, on 22 January the STCU conducted an IPR and Commercialization Round-Table at the G.V. Kurdyumov Institute for Metal Physics in Kyiv, Ukraine. The STCU goal in these types of round-table discussions is to encourage STCU recipient scientists and institutes to develop more collaborations and partnering opportunities with international science peers and commercial S&T customers.

The program included STCU presentations on strategic growth models for Ukrainian institutes, commercialization of intellectual property, the STCU Partners Program, the STCU patent support process, and on working with commercial technology investors.



European Union and STCU Visit to Crimea to Discuss Biosafety & Biosecurity Cooperation

On 26 January in Simferopol (Crimea), the Chairman of the Verkhovna Rada (Parliament) of the Autonomous Republic of Crimea, Anatoly Gritsenko, met with Phillipe Servais (EuropeAid Co-operation Office of European Commission) and STCU Deputy Executive Director (EU) Michel Zayet, to discuss EU-Ukrainian cooperation in the field of Biosafety and Biosecurity and more specifically the action to be con-

ducted at the Simferopol "Ukrainian Anti-Plague Station" of the Ministry of Health of Ukraine.



The EU-STCU delegation then visited the State Organization "Ukrainian Anti-plague Station" in Simferopol, where its experts discussed current biosecurity & biosafety problems. Afterwards, officials of the Simferopol City Administration presented a potential building site for the new facility project.

STCU participates in Ukrainian Conference on Commercialization of R&D Results

On 10 March, STCU assisted in organizing an international conference in Ukraine on commercializing scientific research, an idea that originated from an STCU project. The conference, "Modern S&T: from Funda-





mental Research to Commercialization of R&D Results” was put together with the Ukrainian Dobrov Centre for Scientific and Technological Potential and Science History Studies, and more than 100 participants took part in the conference.

Conference on Spain-ISTC/STCU Cooperation

On 22-23 April, a conference on Spain-ISTC/STCU Cooperation was organized by the Research Centre for Energy, Environment and Technology (CIEMAT) in Madrid, Spain. The conference was organized by CIEMAT, the CDTI, and the CSIC (Centre for Higher Science Research), with support from the STCU and the International Science and Technology Center (ISTC). A total of 35 scientists from Ukraine, Georgia, Russia, and Belarus were sponsored by STCU and ISTC, to promote scientific cooperation with the European Union (with a special emphasis on Spain).



5th Investment Seed Forum, Kyiv

On 28 April, STCU participated in the 5th Investment Seed Forum, organized by the Ukrainian Chamber of Commerce and Royal Norwegian Embassy in Ukraine. The Seed Forum provides new start-up companies with investor matchmaking opportunities. Approximately 150 participants saw 8 investor presentations given by Ukrainian, Norwegian, and Latvian companies.



During the presentations, 3 scientists-entrepreneurs sponsored by STCU presented their start-up company proposals, based on their technologies that are ready for commercialization. An STCU booth offered STCU promotional materials and technology profile forms to potential investors and visitors.

STCU 30th Governing Board Meeting

On 27 May, the 30th Meeting of the STCU Governing Board met in Tbilisi, Georgia and approved over \$6.6 million USD plus EURO 1.8 million in cooperative science projects. To this total, matching project funding was committed by Ukraine and Georgia, amounting to over \$580,000 USD and \$380,000 USD, respectively.

These amounts bring the total amount of STCU project funding to over \$200 million USD in its 15 years of operations.



2010 Highlights and Accomplishments

Space Mission to Sweden

Upon the guidance from the Swedish Royal Academy of Engineering Sciences (www.iva.se) a Swedish Space Mission was designed in early June to establish contacts between the Swedish Space sector and the organizations supported by STCU projects currently looking for new Partners and long lasting industrial business relations. The group comprised scientists and business developers from Yuzhnoye State Design Office. The visited entities included the Swedish Space Corporation in Stockholm, RUAG Space (former SAAB Space) in Gothenburg, and finally Microtec AB Start-up Company based on the campus of the Uppsala University.



STCU participated in the 13th Annual Conference of the European BioSafety Association

STCU participated in the 13th Annual Conference of the European BioSafety Association (Ljubljana, Slovenia) 21-23 June, sponsoring a delegation of three representative's from the Ukrainian Anti-Plague Station, Central Sanitary and Epidemiological Station of Ministry of Health of Ukraine and the directors from two Research Institutes and National Center for Disease Control and Public Health of Georgia.



The EBSA program covered a wide range of scientific and regulatory areas that are expected to have an impact on biosafety and laboratory biosecurity. Conference presentations on GMMs, “green” and sustainable laboratories and new approaches to regulatory frameworks on the national level were of particular interest. 218 delegates from 34 countries attended despite the fact that the conference had been postponed due to volcano ash. Seven pre-conference workshops took place.

STCU Participated in TechConnect World Investment Exhibition in Anaheim, CA

STCU participated in the TechConnect World Investment Exhibition June 21-24 in Anaheim, CA. In order to be admitted to this exhibition one has to be selected



by the organizers of the event. With STCU's help CIS scientists submitted IP descriptions and business plan summaries to TechConnect. Three CIS scientists were pre-selected by conference organizers to take part in this event with their pitch presentations. TechConnect is aimed at bringing together the world's top technology transfer offices, companies, entrepreneurs, and investors to view and discuss the most promising technologies and early stage companies from across the globe. From their participation the scientists learned how western investors actively strengthen the innovation pipeline and create an environment for technology marketing, matchmaking and investment. STCU's booth offered technology profile forms, technology materials on CD disks and in printed form.

STCU visits Belgian Nuclear Research Centre

On 5-6 July, under the Belgium EU Presidency, the



STCU met with the Belgian Nuclear Research Centre SCK•CEN of the Belgian Federal Minister for Energy, one of the largest research centres in Belgium with laboratories in Mol. The STCU supported delegation also visited their underground laboratory HADES, at a depth of 225 m, where there are studies of clay as potential geological host formation for long-lived and high-active nuclear waste.

Grant Writing Skills Training

During 12-21 July, STCU held Grant Writing Skills Training Workshops in several cities of Ukraine, Moldova, Azerbaijan, and Georgia. Prof. Ian Butler (Canada) and Dr. Helmut Holtbecker (European Union) made presentations to more than 250 scientists, and held personal consultations with some of the participating scientists, to help these scientists develop better research grant writing skills, and to gain better understanding of the unique challenges in writing effective science research proposals.



STCU Space Mission to the Netherlands and Belgium

Jointly organized with the National Space Agency of Ukraine, the State Design Office Yuzhnoye and with the support of Yuzhnoye Permanent Representative for Europe Mr. Oleg Ventskovsky, a promotional and exploratory mission was conducted to the Noordwijk

2010 Highlights and Accomplishments



European Space Agency ESTEC (European Space Research and Technology Centre). A meeting took place with Mr. Frank Salzgeber, Head of the Technology Transfer Program and was followed by a technical visit of the facilities. Then the group travelled to Charleroi, Belgium to attend the 12-13 October Third Edition of the Space Days, presented by the Wallonie Espace Cluster. As a result, STCU received an invitation to co-exhibit on the ESA booth at Hannover Messe 2011, and developed ties with the University of Liege, Centre Spatial, in addition to the Von Karman Institute for Fluid Dynamics.

UNECE International Conference "From Applied Research to Entrepreneurship"

STCU helped organize this 9-11 November conference at Kyiv Polytechnic Institute, sponsored by the United



Nations Economic Commission for Europe (UNECE), on the topic of Entrepreneurship at Universities and Scientific Institutes. Vice-Premier of Ukraine, Mr. S. Tihipko opened the conference, and many international speakers and Ukrainian speakers discussed approaches being used in other countries to aid entrepreneurship, at institutes and universities. An exhibition of technologies during the conference at KPI's Science Park was organized by the newly formed Association of Commercialization Professionals of Ukraine (ACPU) and CTCO's – Chief Technology Commercialization Officers, from Georgia, Azerbaijan, Moldova and Ukraine.

31st STCU Governing Board Meeting

The 31st STCU Governing Board Meeting was held on 18 November in Kyiv, Ukraine, with officials Canada, the European Union, Ukraine, the United States, and Georgia in attendance. The Board approved 8 new regular scientific projects for a total of \$384,102 USD and EURO 316,228, confirmed 8 new Partner Projects valued at \$1,981,635 USD, and confirmed 7 Partner Project contract extensions valued at \$657,155 USD and EURO 12,426.

The Board also noted the inception of a new EURO 4 million Ukrainian biosecurity improvement project, to be implemented through STCU and financed by the European Union. The Board also approved appointments to several STCU management positions.





The Governing Board also approved 6 STCU-Azeri Targeted Initiative projects, totaling \$299,361 USD, with another \$299,361 USD in matching funds from the Azeri National Academy of Sciences, and 6 STCU-Moldovan Targeted Initiative projects, totaling \$149,569 USD, with another \$149,569 USD in matching funds from the Moldovan Academy of Sciences.

STCU Scientists Participated in Seed Forum in Ukraine

Five scientists from Kyiv and 3 from Kharkiv participated in Seed Forum - an investment event, sponsored by Royal Norwegian Embassy in Ukraine. Four STCU scientists, who have start-up companies in Ukraine, took part with their product and company "pitch" presentations in a one-day Pitch Training seminar. The Pitch Training Seminar was organized by the Seed Forum (www.seedforum.org), which is a London-based International foundation. After that, the four scientists-entrepreneurs took part in Seed Forum investment event with enhanced pitch presentations in Kyiv (December 2) and for the first time in Kharkiv (December 7).



In addition to the round table in Moldova, STCU conducted session with 4 institutes in Chisinau. There were discussions on how to advertise and promote technologies in STCU brochure "Science Opportunities in Moldova".

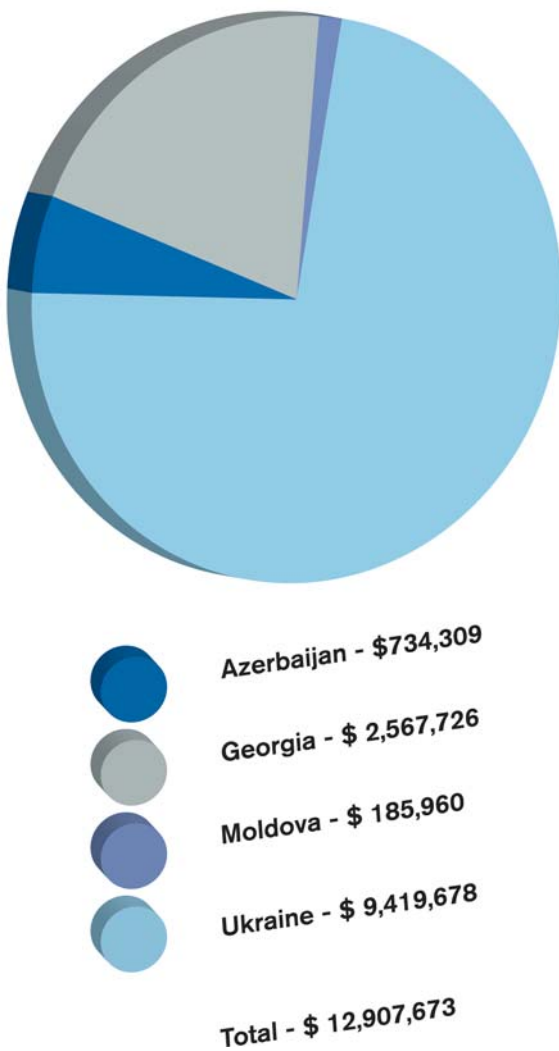


IPR and Commercialization Round Tables in Chisinau, Baku and Tbilisi

Around 150 participants took part in the events "IPR and Commercialization of R&D: US and Ukrainian Experience" Round Tables in Chisinau, Baku and Tbilisi on 13-18 December. Speakers shared US and Ukrainian experience in technology transfer.

Financial Activity

New Project Funding in 2010 by LOCATION OF RECIPIENT ORGANIZATION:



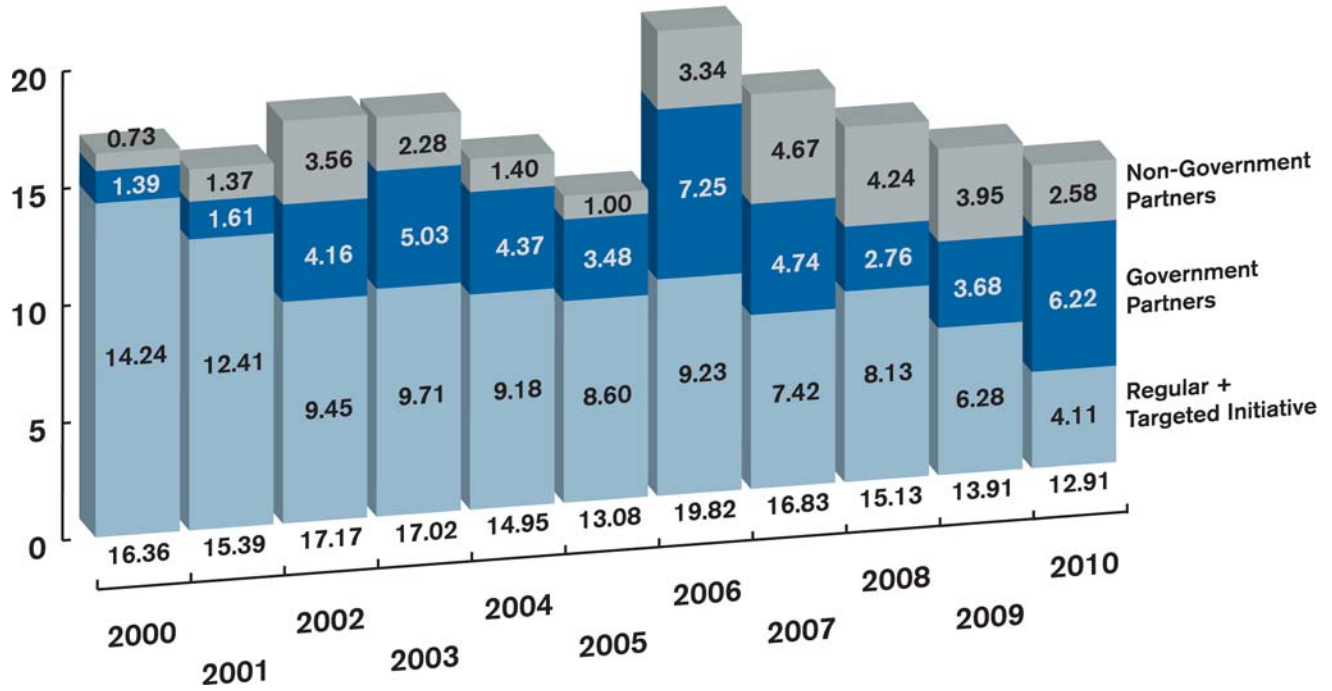
The Year 2010 saw a continued reduction in the amount of new STCU project funding, compared with the record funding year recorded in 2006. In 2010, the STCU Governing Board approved over \$12.9 million (USD equivalent) in new projects, a decrease of approximately \$1.0 million in total new project funding compared with 2009, and a decrease of approximately \$6.9 million compared with the STCU's record year of 2006.

New Partnership Project funding in 2010 saw an increase in levels as compared to that achieved in 2009, but still below the highs of 2006 and 2007. In 2010, new project funding from all Partner organizations represented 68.2% of the total amount of new STCU project funding approved in 2010. This is a large increase compared with 2009, which saw New Partnership Project funding representing just over half (54.9%) of new project funding. At just over two-thirds of new project funding in 2010, the role that Partners play in project funding at the STCU is very important. Furthermore, the decrease in the percentage of funding provided by the STCU's three core Funding Parties (U.S., Canada, and the European Union) is also important to understand, as it presents an administrative challenge to the STCU.

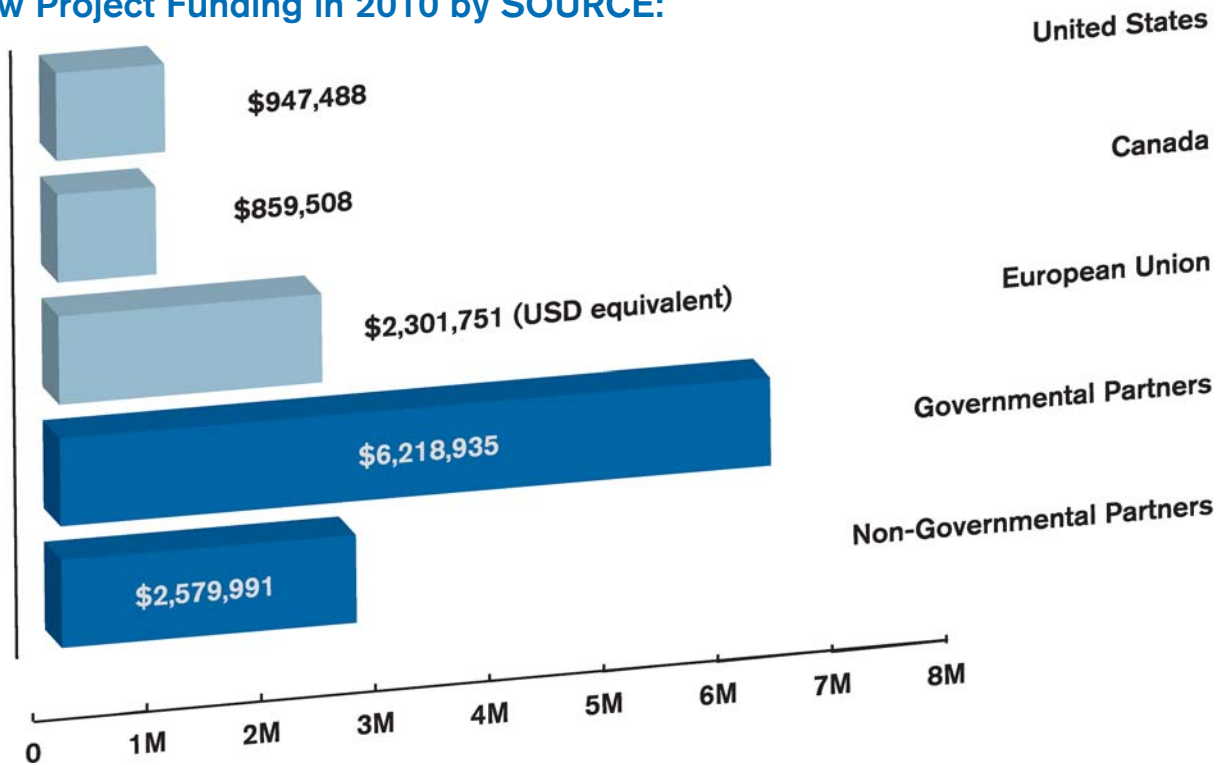
As in previous years, external auditors from Lubbock Fine Chartered Accountants audited the financial management and accounting systems, as well as the system of internal controls for both the operations of the STCU administration and STCU-funded projects. The results of this audit can be found on the STCU's website at: www.stcu.int/documents/stcu_inf/reports/audit/2010/. Some weaknesses were identified in conjunction with the December 31, 2010 financial statement audit and will be corrected during the course of 2011.



New Regular/Partnership Projects Approved for Funding, 2000-2010 (funding in millions USD)

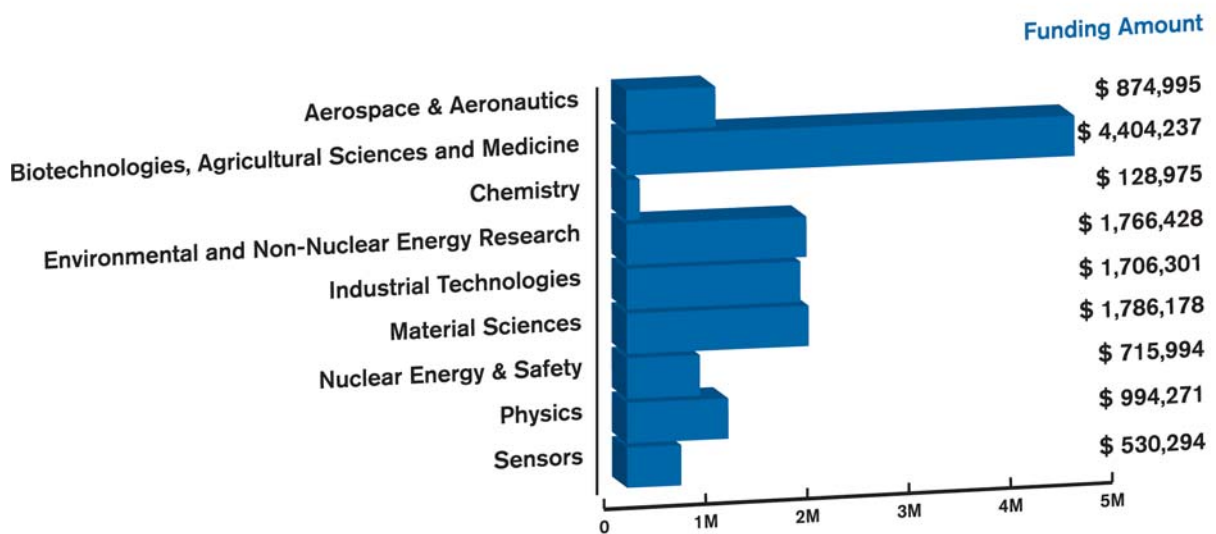
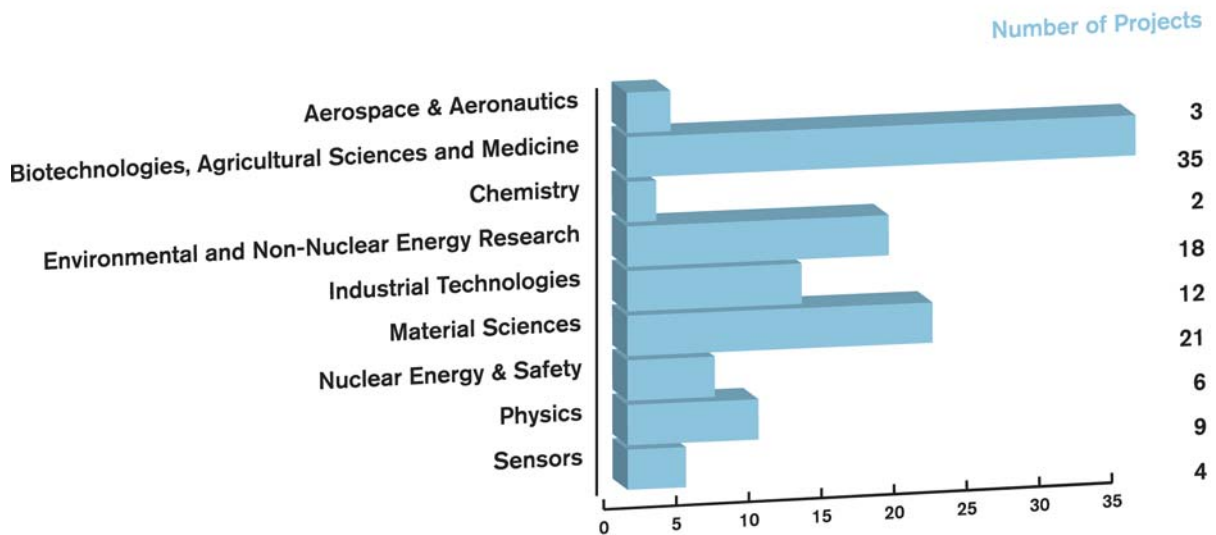


New Project Funding in 2010 by SOURCE:



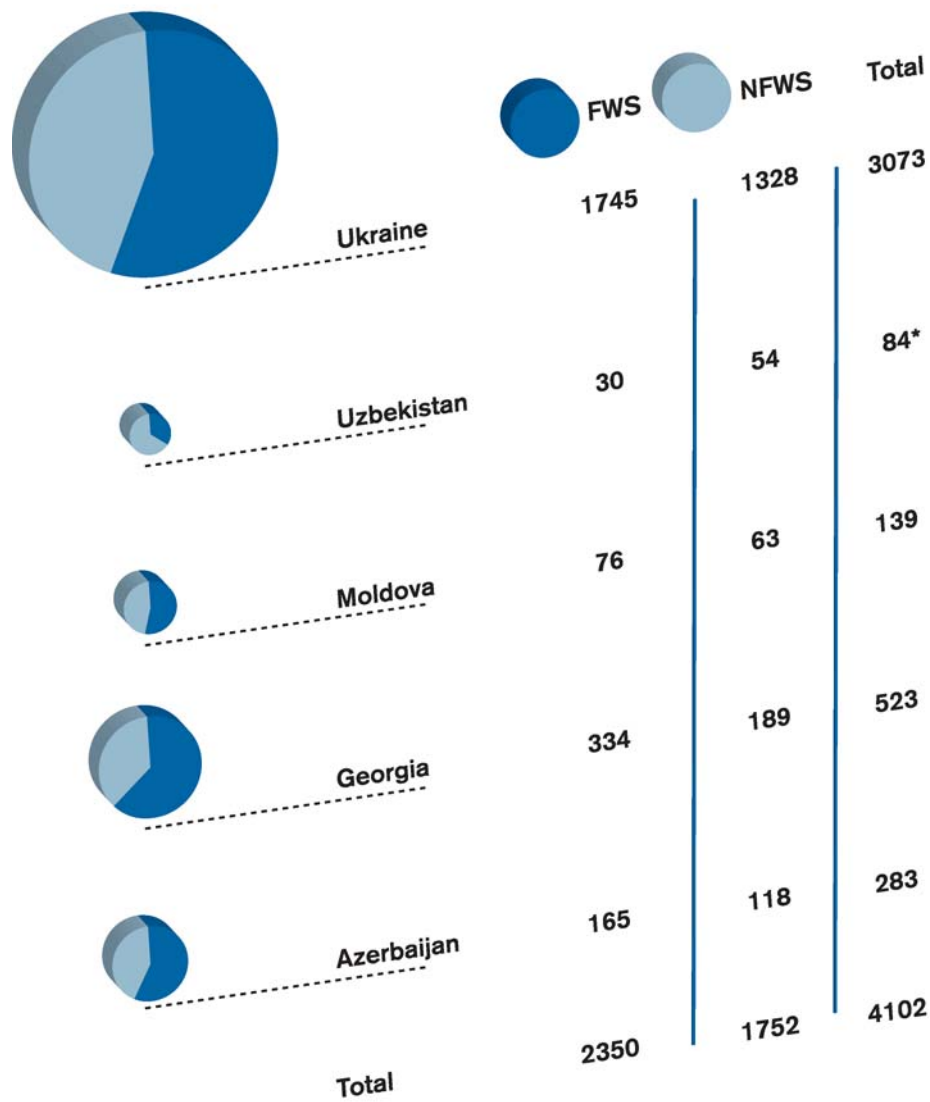
Financial Activity

New Project Funding in 2010 by PRIMARY TECHNICAL AREA:





**Participants Redirected to STCU Projects in 2010 by Country:
(former weapon scientists/non former weapon scientists/total):**



* Final Uzbek projects were terminated in June 2010.

STCU 15th Year Anniversary Celebration

On 17 November 2010, the STCU held its 15 Year Anniversary Celebration on the campus of the National Technical University of Ukraine “Kyiv Polytechnic Institute” (Kyiv, Ukraine). Over 200 people joined in this celebration, including the Canadian, EU Delegation, and U.S. Ambassadors; and senior government officials from Ukraine, Azerbaijan, Georgia, and Moldova; as well as ambassadors and other senior government officials from the Sweden, Norway, the United States, the European Commission, Canada, and others. Many leading S&T institute directors, scientists, and current and former STCU Secretariat staff joined in the festivities.



STCU was pleased to have two of its past Executive Directors, Prof. Ostap Hawaleshka and Mr. Leo Owsiacki, join the current Executive Director, Andrew Hood, in talking about the STCU’s history and its unique development as an intergovernmental WMD nonproliferation center headquartered in Ukraine. Prof. Hawaleshka struck the keynote of the celebration, noting that in the beginning, STCU was the first organization of its kind to be headquartered in Ukraine, and thus STCU worked hard to build trust and establish a solid position of credibility within Ukraine (which was in the throes of establishing itself as a newly independent, and functioning democratic state). Mr. Owsiacki cited the hard work of the STCU staff to build operational momentum while

overcoming sudden obstacles to STCU’s operations. Mr. Hood, in looking back over the 15 years of accomplishments, observed that STCU’s success was not limited to the WMD nonproliferation area, but encompassed a unique experiment in multilateral cooperation that far exceeded the ideas and goals of its 1995 originators. All the Executive Directors spoke optimistically about the future of STCU, as a platform for future partnerships and professional networks working in a broad arena of nonproliferation, security enhancement, and regional improvement.

STCU History and Major Program Accomplishments:

The STCU was the first intergovernmental organization in Ukraine and was established by an Agreement signed on 25 October 1993, by the four Founding Parties: Canada, Sweden, Ukraine, and the United States of America. The Agreement came into force on 4 May 1994, when Ukrainian President Kravchuk issued a decree accepting the STCU Agreement.

The STCU became fully operational when it stood up its technical Secretariat and held its first Governing Board Meeting on 14-15 December 1995. It is on the occasion of this first Governing Board Meeting that STCU celebrates 15 years of working toward a better and safer world.





Later, the European Union acceded to the STCU Agreement in November 1998, replacing Sweden as a Governing Party to the STCU Agreement. Over the years, Azerbaijan, Georgia, Moldova, and Uzbekistan joined STCU as member parties. Today, the STCU is headquartered in Kyiv and has field offices in Baku, Chisinau, and Tbilisi as well as in Kharkiv and Lviv. Japan has also participated as a special sponsor of STCU projects.

Since the first STCU Governing Board meeting in 1995, STCU has sponsored over 1,400 cooperative science research projects amounting to over \$200 million (USD equiv.) in research grant funding to Ukrainian, Azeri, Georgian, Moldovan, and Uzbek scientists. STCU has engaged nearly 18,000 scientists, of which approximately 10,000 were former weapon scientists during the Soviet era.

From 1995 until the 17 November event, STCU had awarded the following amounts of project funding to scientists and technicians in the STCU Recipient Parties:

Azerbaijan = \$4,903,444 (USD equiv.)
 Georgia = \$9,908,560 (USD equiv.)
 Moldova = \$1,662,636 (USD equiv.)
 Ukraine = \$174,568,454 (USD equiv.)
 Uzbekistan = \$16,440,779 (USD equiv.)
 Total Project Funding = \$207,483,873 (USD equiv.)

STCU has also connected these scientists to a wide variety of governmental- and non-governmental Partners. As of today, STCU has managed over \$70 million USD equiv. in R&D projects sponsored by these external partners, including governmental programs and many American, Canadian, and European businesses.

Since 1995, the total project funding contribution from STCU Funding Parties and other donors has been as follows:

Canadian Government = \$9.8 million (USD)
 European Commission = EURO 34.9 million
 Other European Governments = \$5.9 million (USD equiv.)
 Japanese Government = \$1.04 million (USD)
 Swedish Government = \$1.67 million (USD)
 U.S. Government = \$116.9 million (USD)

All non-governmental and private sector partners = \$30.3 million (USD equiv.).

STCU is also proud to have been a catalyst for the ‘evolution to partnership’ among the former Funding and Recipient Parties. Since the start of STCU Targeted R&D Initiatives Program in 2005, the STCU Recipient Parties have contributed the following amounts in project funding (with every dollar matched by STCU Funding Party funds):

Moldova = \$149,991 (USD)
 Azerbaijan = \$941,008 (USD)
 Georgia = \$1,137,353 (USD)
 Ukraine = \$3,172,881 (USD)
 Total = \$5,401,233 USD (matched by an equal amount by the Canadian, EU, and U.S. Funding Parties)

Project Activity in 2010

Overall, new approved project funding for STCU declined again in 2010, the fourth year in a row of such declines. In 2010, the STCU Governing Board approved and financed 110 new projects, totaling approximately \$12.91 million, USD equiv (\$5.92 million USD plus EURO 3.66 million). These 110 new projects will engage 975 former weapon scientists (along with 778 non-weapon scientists). Among all technical areas, the largest amount of new project funding (approximately \$4.4 million USD equiv) was approved in the category of biotechnology/agricultural sciences/medicine. In addition to this \$12.91 million USD equivalent contributed by the STCU Funding Parties, approximately \$1.6 million USD in project co-financing was committed under the 2010 Targeted Initiative Program by the STCU Recipient Parties of Ukraine, Azerbaijan, Georgia, and Moldova (this project co-financing is not administered by STCU, thus is not counted within the \$12.91 million total for STCU project funding).

As was the case last year, a lower 2010 total of new Regular Project was the cause for the overall project funding reduction, with the Regular Project rate-of-decline from 2009-2010 (\$6.28 million USD equiv, to \$4.11 million USD equiv) being slightly steeper than the 2008-2009 rate-of-decline (from \$8.13 million USD equiv, to \$6.28 million USD equiv). Thus, the year 2010 continued the steady downward trend in total new project funding for STCU since the peak year of 2006 (see Financial Section for details).

The transition in types of new STCU projects being approved gathered pace in 2010, due to the fewer number of new Regular Projects (and fixed number of Targeted Initiatives Projects) being sponsored by the

Funding Parties. Of the 110 new projects approved in 2010, 50% were Partner Projects, 32% were Targeted Initiative Projects, and 18% were Regular Projects. More significantly, for the first time in STCU history, active Partner Project expenditures in 2010 exceeded the combined expenditures of all active Regular and Targeted Initiative projects.

The year 2010 provided growing evidence that the STCU Parties were creating “facts on the ground”, by eschewing approval and funding of Regular Projects while encouraging more active participation of other project sponsors and more Recipient Party co-financing through the Partners Program, the Targeted Initiative Program, and the nascent Targeted Research Program. This trend is pushing STCU in the direction of managing a more targeted, more holistic programmatic approach toward its mission objectives. Indeed, the character of STCU and its mission appears destined to change, if not through policy adjustments issued by the Governing Board, then by the evolving profile of administrative workload due to this changing active project portfolio.



Regular Project Activity

The Governing Board approved 20 Regular Projects in 2010, totaling approximately \$2.67 million USD equiv (\$768,690 USD plus EURO1.43 million). This is nearly a 28% decline from the total Regular Project funding received in 2009.

The approved Regular Projects for 2010 covered numerous scientific research areas, with the primary interest reflected in biotechnologies/agricultural sciences/medicine, material sciences, environmental

and non-nuclear energy research, and industrial technologies.

These new Regular Projects will engage 164 former weapon scientists (plus 111 non-weapon scientists) in collaboration with scientific colleagues from Canada, Europe, and the United States.

New Steps in Novel Material Development



Total funds allocated: \$ 190,000

An integral part of development of modern engineering is application of novel materials with high physico-mechanical and service characteristics under conditions of intense wear and active corrosion media at temperatures over 1000°C.

Principal requirements for protective coatings that operate in aggressive media at high temperatures are high refractoriness and high heat and corrosion resistance. Materials based on borides and silicides of 1Y-YI group transition metals relate to the most promising materi-

als of this kind. They have been used for protection of aircraft bodies when entering dense atmosphere layers and in power equipment for protection of combustion chambers as well as in chemical and related branches of industry.

STCU Project #3522 (by the I.M. Frantsevich Institute of Problems of Material Science) developed novel materials on the basis of nanostructured powdered composites for layered protective coatings with high physicochemical properties. In the course of the project execution, the kinetic peculiarities of formation of nanosized powders of refractory chromium compounds and solid solutions on their basis were studied and their structural and physicochemical properties were determined. This allowed the development of related novel nanostructured materials with high corrosion, heat and wear resistances in aggressive media and the manufacture of coatings from them using electrolyze and phoresis techniques with subsequent investigation of the mechanism of component interaction in layered coatings.

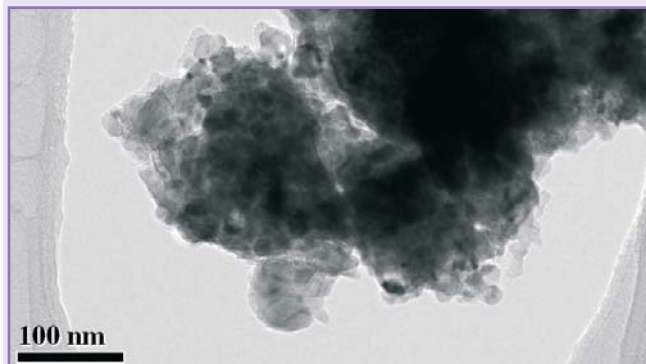


Fig. 1. $\text{Cr}_{0.9}\text{Ta}_{0.1}\text{Si}_2$ nanopowder.

Project Activity in 2010

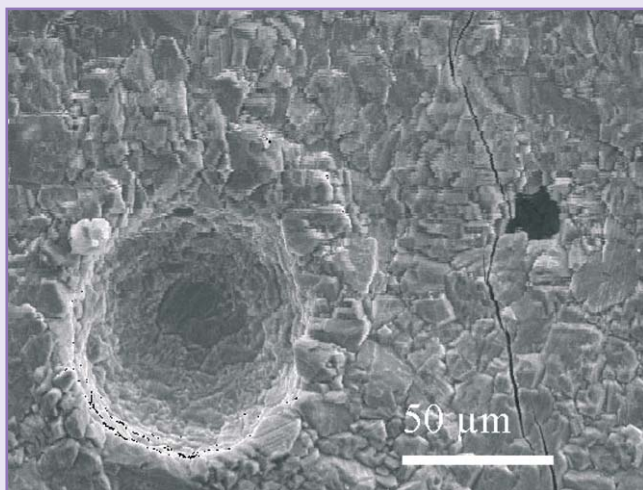


Fig. 2. The surface of galvanophoretic coating from CrSi_2 upon heat resistance tests (17 thermal cycles)

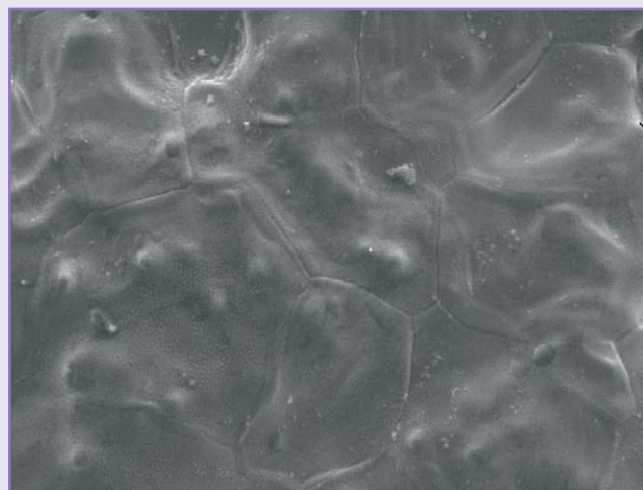


Fig. 3. The surface of galvanophoretic coating from $\text{Cr}_{0.9}\text{Ta}_{0.1}\text{Si}_2$ upon heat resistance tests (56 thermal cycles)

Technological processes of production of protective electrolytic and galvanic-phoretic coatings with the preservation of a nanostructure were elaborated, and technological techniques for control of the thickness ratio for the two types of coatings and layers with micro- and nanoparticles were developed.

New Treatment to Fight Cerebrovascular Disorders Found



Total funds allocated: EURO 35,739

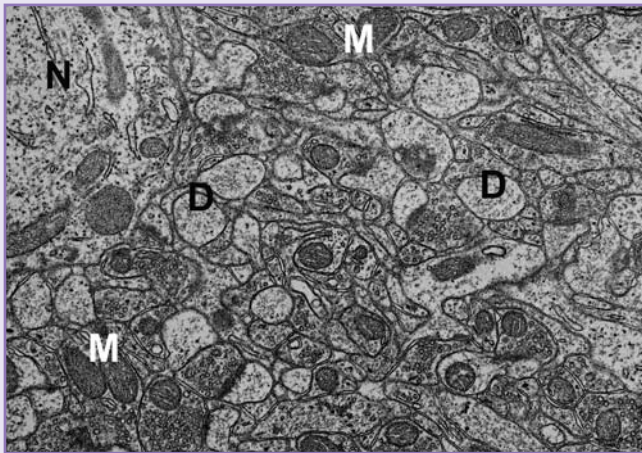
In recent years, cerebrovascular disorders (including stroke) have become worse in all countries, including Ukraine. These pathologies quite often have grave consequences expressed in motor, speech and other physical disturbances.

The **STCU Project #4424 “The study of the neuro-protective effect of a fluorine-containing compound in brain ischemia model”** (project had been carried out at Cytology Department of Bogomoletz Institute of Physiology) resulted in significant advances in searching for effective medical remedies for patients suffering from acute brain ischemia. The project investigated neuroprotective effects of flocalin on neurons

of hippocampus under brain ischemia (flocalin is fluorine containing an analogue of the mitoKATP-channel activator pinacidil, synthesized in the Institute of Organic Chemistry. Hippocampus is known to be a brain structure that is responsible for memory and learning formation.

Brain ischemia was modelled in gerbils (*Meriones unguiculatus*) by means of occlusion of both carotid arteries (BCAO) with following reperfusion.

Studying of influence of flocalin administration on the state of cellular organelles (mitochondria, endoplasmic reticulum, nuclei etc.) and synaptic apparatus of neu-

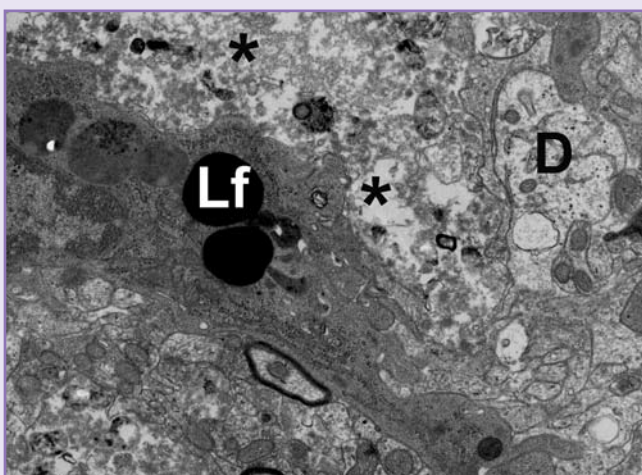


Electron micro photo of CA1 hippocampal area fragment of control gerbil: N-neuron, M-mitochondria, D-dendrites. Magnification – 18000.

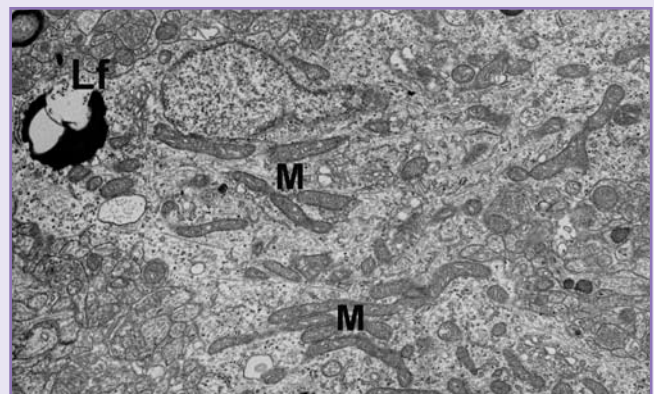
Electron microscopic investigation of hippocampal neuron mitochondria complex also revealed a number of peculiarities in mitochondria structure appearing under focalin administration. During analysis of these peculiarities, it was found that focalin treatment under cerebral ischemia induced the development of compensatory adaptive changes in hippocampal tissue enhancing the cell's potential to survive under oxygen deficiency.

Based on data of ultra structural researches and morphometrical analysis it was concluded, that activator of mitoKATP channels focalin can be applied as an effective neuroprotective agent for prevention of brain tissue damages under ischemia.

rons of hippocampus under conditions of brain ischemia was carried out by electron microscopy and morphometric analysis methods. The analysis found that focal had a neuroprotective influence on the hippocampus neurons.



Electron micro photo of ultra structural changes in cytoplasm of pyramidal neuron of CA1 hippocampal area of gerbil on the 7th day after 7-minute occlusion. Pyramidal neuron destruction (star), aggregation of lipofuscin granules (Lf), dendrite swelling (D). Magnification -18000.



Electron micro photo of ultra structural changes in CA1 hippocampal area of gerbil on the 7th day after 7-minute occlusion when focalin was applied. Degradation of lipofuscin granules (Lf), formation of elongated mitochondria (M). Magnification – 16000.

Project Activity in 2010

Step-F Satellite Telescope of Electrons and Protons Has Started Its Work on the Open Space



Total funds allocated: EURO 92,156

The unique satellite telescope of electrons and protons STEP-F started its work on February 20, 2009 on the board of Russian spacecraft “Coronas-Photon”. On January 30, 2009 this satellite was launched into low near-Earth orbit by the Ukrainian rocket “Cyclone -3” launched from the Cosmodrom “Plesetsk” (Arkhangelsk region, Russian Federation).

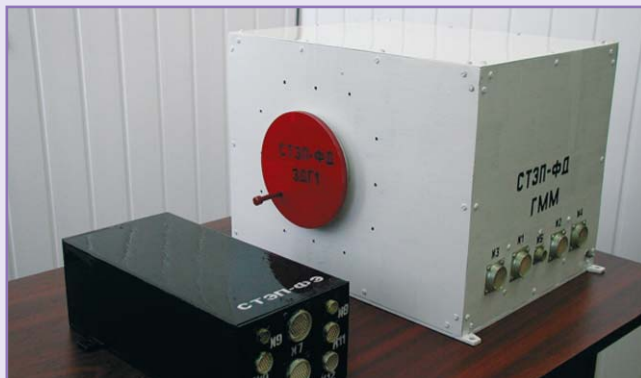
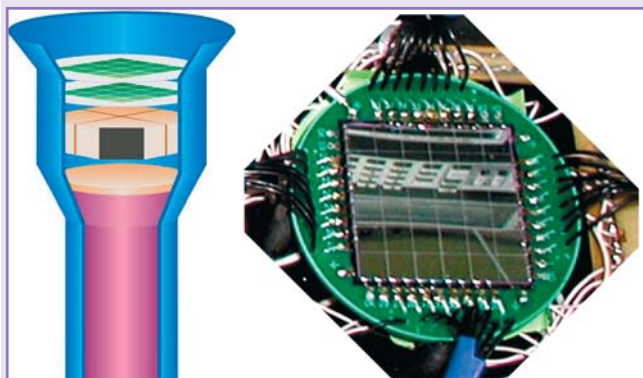
First models of the instrument – laboratory model, weight-dimensional and technology models were developed with a great financial and organizing assistance of STCU. The team of experts from V. Karazin Kharkiv National University working within **STCU Project #3542** developed novel version of satellite devices for measuring of charged energetic particle fluxes. The main features of this model are the application of position-sensitive detectors matrices as well as scintillation detectors viewed by large area silicon photodiodes. An advantage of such design is a wide energy range for each particle type with simultaneous definition of spatial direction.

STEP-F Satellite Telescope of Electrons and Protons was designed and manufactured in V.N. Karazin Kharkiv National University in cooperation with Science and Research Institute of Radio Technical Measurements (Kharkiv). Research Institute of Micro devices (Kyiv) and the Institute of Scintillation Materials (ISMA, Kharkiv). STEP-F Satellite Telescope is



developed for continuous measurement of electron, proton and alpha-particle fluxes trapped in Earth’s inner and outer radiation belts. These particles precipitate from radiation belts into the atmosphere after and during solar flares, geomagnetic storms, sudden ionosphere disturbances. “STEP-F” is created for obtaining information about fluxes and spectra of energetic particles to study energetic solar cosmic rays and their transport through interplanetary space, to study the dynamics of Earth’s radiation belts.

The first experimental data were obtained during flight tests of spectrometer-telescope STEP-F that moves with a high speed at the altitude of 550 km and the inclination of satellite orbit of 82.5°. The preliminary processing of results demonstrates full reliability of instrument, to study radiation in the polar caps and Earth radiation belts.





Novel Compounds in Tuberculosis Treatment Developed



Total funds allocated: \$ 249,340

The increased incidence of drug-resistant tuberculosis highlights the need for new antitubercular drugs. Equally urgent is the need for new antiviral agents, especially with the growing concern for the next influenza pandemic.

The combination of expertise of Georgian and USA scientists under **STCU Project #4170** resulted in development of a new novel generation compounds with antitubercular and antiviral activity, based on the original indole-containing tetracyclic systems - isomeric dioxodihydro-1H-benzo[b]thiophene indoles and benzo[b]thiophene indoles.

More than 170 new indole-containing condensed tetracyclic systems have been synthesized, identified and sent for screening to the US NIH's NIAID-sponsored compound screening programs, the Tuberculosis Antimicrobial Acquisition and Coordinating Facility (TAACF) (www.taacf.org) and the Antimicrobial Acquisition and Coordinating Facility (AACF) (www.niaid-aacf.org).

Under coordination of the Southern Research Institute (Birmingham, Alabama) these programs provided the Georgian scientists with compound screening services against tuberculosis and 30 viruses (including influenza A and B strains).

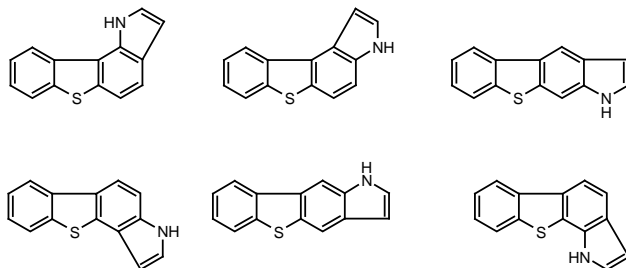
Many of them showed preliminary high (up to 100%) anti-tubercular in vitro and antiviral (IVA (H1N1), IVA (H3N2) and IVB) activities:

Ten compounds having more than 90% in vitro activities passed primary and secondary screens and 5 of them had been chosen for in vivo screening against Mycobacterium tuberculosis (H37Rv). More than 10 com-



pounds are being in vivo screened against different viruses now.

All isomers of benzo[b]thiophene and benzo[b]furan indoles:



S=S - benzo[b]thiophene indole
S=O - benzo[b]furan indole

Project Activity in 2010

Power and Efficiency of Natural Computing: Neural-Like P (Membrane) Systems



Total funds allocated: EURO 193,699

In the frame of the **STCU project #4032** the Institute of Mathematics and Computer Science investigated new computational possibilities provided by computing with biomolecules. Biocomputing (also known as molecular computing) is a new interdisciplinary area of science where computer science, chemistry, biology, and physics meet, that promises revolutionary changes in computations in the near future. It aims at developing new devices and computing systems to manipulate information operating at atomic or molecular scale on the basis of biological, chemical, electronic, photonic and/or mechanical principles.

It was investigated both theoretical and practical aspects of some important models of biocomputing. An intramolecular model for gene assembly process in ciliates as a bio-inspired paradigm suitable for represented in tissue-like P systems also is considered. The scientists found out the frontier of undecidability in problems for biocomputing models in order to better understand their computational possibilities (universality, efficiency, complexity and so on).

It was introduced a new variant of test tube systems, length-separating test tube systems, based on biologi-

cal splicing operation where the communication of the words (molecules) among the test tubes is based on filtering by their lengths, motivated by the gel electrophoresis laboratory technique. It was showed that the length separating test tube systems, even with very restricted size parameters, are able to simulate the Turing machines. Membrane computing is a formal framework of distributed computing and cellular computing. There has been introduced a new variant of the multiset rewriting model of P systems called polymorphic P systems where the rules of every region are defined by the contents of interior regions, rather than being explicitly specified in the description of the system. This idea is inspired by the von Neumann's concept of "program is data" and also related to the research direction proposed by Gh. Paun about the cell nucleus. It was also investigated splicing P systems and proved the remarkable fact that six splicing rules are powerful enough for the universality (we got the smallest known number of rules of universal P systems). Membrane systems are a convenient framework of describing polynomial-time solutions to certain intractable problems in a massively parallel way. Division of membranes makes it possible to create an exponential space in linear time, suitable for attacking problems in NP and even in PSPACE. Methods of membrane computing to computer algebra and mathematical linguistics were implemented. The mentioned domains can be characterized of extremely complex problems that make natural to search for techniques of efficient solutions. The results showed that methods of membrane computing are good candidates to solve efficiently the problems in these domains.

Within the project was obtained many serious theoretical and practical results published in prestigious international journals. Participants of the project are the coauthors of two chapters of the monograph "The Ox-





ford Handbook of Membrane Computing”, Oxford University Press, 2010, one chapter in the book “Scientific Applications of Language Methods”, Imperial

College Press, 2010. The obtained results may be useful in process of designing of new generation computers based on biological principals.

Geophysical Instrumentation, Based on the High-Sensitive Magnetometers, for Multiparametric Tomography of the Earthquake Hazardous Zones



Total funds allocated: EURO 158,776

Recently, the **STCU Project # 4818 “Development of in-situ calibration methodology and instrumentation for high sensitive magnetometers”** allowed the Lviv Center of the Institute of Space Research to create a new reference flux-gate magnetometer LEMI-025 (Fig.1) which is the only 1-second INTERMAGNET standard magnetometer in the world. First results of this magnetometer and newly developed calibration methodology tests showed high potential interest to these developments of numerous owners of geomagnetic observatories in the world. It is already manufactured and delivered to several customers in Canada, France, South Africa and Russia.

This project is facilitated due to the work with real data processing from field magnetometers ULF-ELF signals

of lithospheric and ionospheric origin, including electromagnetic interference (Fig. 2) to detect earthquake precursors.

A data measuring campaign was organized with Japanese, Indian, and Chinese participants in several sites placed in seismo-hazardous areas of India, Japan and China. The magnetic field measurements were provided with a set of three-component magnetometers LEMI-30 developed in the Institute and delivered by contracts during last two years to the geophysical groups engaged in EQ studies in frames of national programs. The obtained results showed that the new efficient method of the recognition of electromagnetic signals connected with seismic activity is created.



Fig. 1. Magnetometer LEMI-025



Fig. 2.

Project Activity in 2010

Project #5026, "Development of Methods of Bioremediation for Industrially Polluted Soils in Absheron"



Total funds allocated: EURO 183,378

One of the most ecologically unsuitable areas of Azerbaijan is the Absheron Peninsula, where during oil production has accumulated a large quantity of industrial wastes. Recently there has been an increased interest in development of bioremediation technologies for cleaning soils polluted with heavy metals (HM) and radionuclides (RN). Bioremediation includes the methods of cleaning of soil from waste of oil industry, heavy metals, salts, and different toxic compounds by use of plants, microorganisms, also invertebrate animals.

Also, there is an opportunity for phytoremediation technology to clean the soils of these areas, as from the viewpoint of removal of HM and RN, and avoidance from load and for additional financial charges, which are unavoidable on application of physical and chemical methods of clearing.

The team of experts of **STCU Project #5026 "Development of Methods of Bioremediation for Industrially Polluted Soils in Absheron"** developed a conceptual technology model of phytoextraction of heavy metals and radionuclides on the basis of plants-and invertebrates-accumulators which would be suitable for phytoextraction of HM and RN in situ on the concrete polluted territories of the Absheron Peninsula, Azerbaijan.

The project team measured a radiation background of the polluted soils and analyzed the samples of soil, plants and the invertebrates living in these territories. The specific structure of the plants that have grown on polluted territories is defined. In the tests of soils the following elements were found: K40, RA226, TH232 and U238. The plants-accumulators of heavy metals will be revealed and used for clarification of the polluted soils.



View of oil well and polluted sites, Absheron, Azerbaijan



Partner Project Activity

STCU Partner activity in 2010 was quite strong, producing the third-highest total in Partner Project funding in STCU history. For all of 2010, 55 new Partner Projects and Partner Project Extensions were approved by the STCU Governing Board, all totaling approximately \$8.8 million (USD equiv: \$8.24 million USD plus EURO 420,400). This is an approximately 8% increase over the 2009 Partner Project funding total of \$7.63 million USD equiv. These 55 Partner Projects engaged 470 former weapon scientists (along with 397 non-weapon scientists).

The approximately \$6.22 million (USD equiv) in new Governmental Partner Project funding was the second-highest total in this category, and was a 68% increase over the total achieved in 2009. Leading the way in Government Partner activity was the U.S. Department of Energy/National Nuclear Security Administration's Global Initiatives in Proliferation Prevention (GIPP). New GIPP Partner Project funding approved in 2010 was nearly \$3.86 million USD, making GIPP the single largest source of new STCU project funding in 2010 (capturing a nearly 30% share of the all new STCU project funding approved in 2010). GIPP alone provided more new project funding than the EU Party (in second place at just over \$2.3 million USD equiv), all Non-Government Partners combined (approximately

\$2.58 million USD equiv), the U.S. Party (almost \$950,000 USD from the U.S. State Department), and the Canadian Party (almost \$860,000 USD from the Department of Foreign Affairs and International Trade Canada).

By contrast, the amount of new Non-Governmental Partner Project funding (i.e., project funds from non-governmental and private sector/commercial entities) was lower than at any time since 2005. In 2010, approximately \$2.58 million (USD equiv) in Non-Governmental Partner Project funding was approved, an almost 35% decline from the previous year. It is not clear if this is a result of the global business environment or due to other reasons. Of note, a large portion of this new Non-Governmental Partner Project funding came from European institutions that were involved in European Commission Seventh Framework Program research projects, and were working through STCU Partner Projects to finance Ukrainian participation in their Framework Program projects.

Seven new Partners (1 Governmental and 6 Non-Governmental) joined STCU in 2010, thus bringing the total number of STCU Partner organizations to 210: 27 Governmental Partners and 183 Non-Governmental Partners.

Finishing Technology and Organization of Manufacturing Biosoluble in Vivo Stents Made of Ultra Fine-Grained Magnesium Alloys



Total funds allocated: \$ 206,660

The principal cause of myocardial infarction is corking of coronary vessels which supply heart by oxygen. For last 30 years the most effective method of blood vessels de-blocking is operation called Percutaneous Transluminal Coronary Angioplasty (PTCA, Fig.1).

During angioplasty a surgeon insert a hollow catheter with small deflated balloon on the end into the blocked

section of a coronary artery. Then the balloon is inflated to push open the channel of an artery. The catheter with balloon is removed once the artery has been fully opened.

In 80 % of operational angioplasty cases the special device named "stent" is implanted into the channel of unblocked artery. The stent is an open work metal tube

Project Activity in 2010

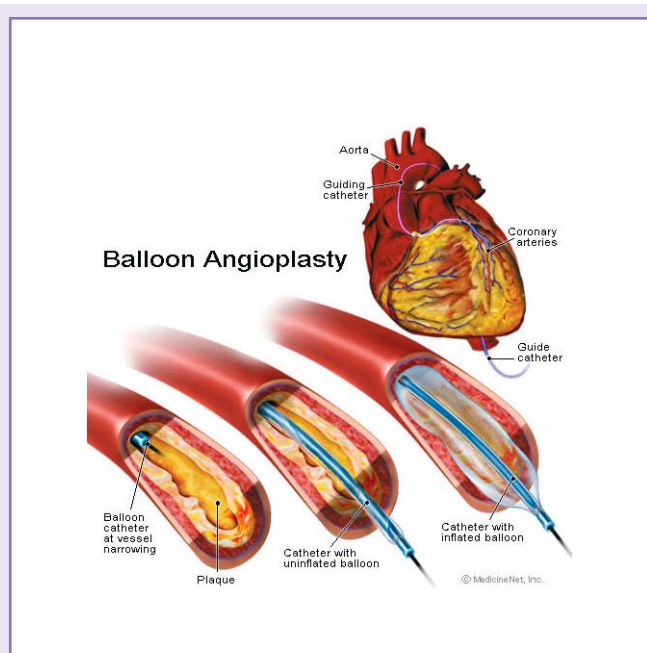


Fig. 1. Angioplasty

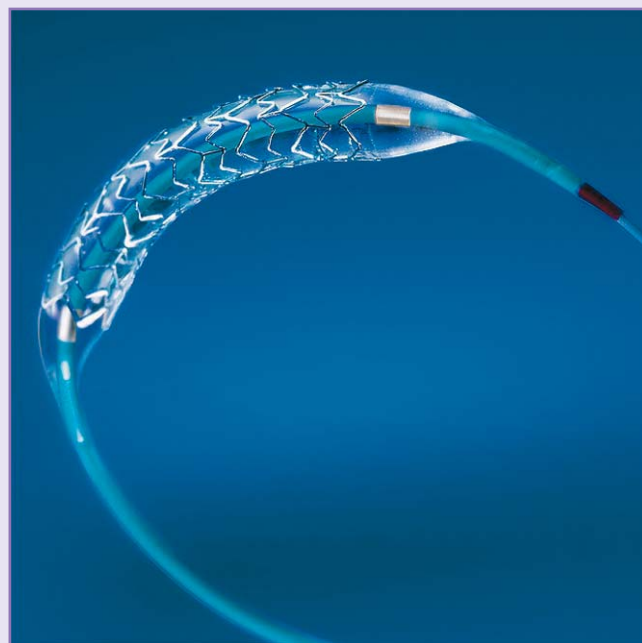


Fig. 2. Stent on inflated balloon

and it is used as "scaffold" for vessel's wall. The stent itself is mounted on a balloon catheter and can be opened once inside the blocked site of coronary artery.

For the last years the National Science Center "Kharkiv Institute of Physics and Technology" in the framework of **STCU Partner Project P305** (partner – the UK Department of Energy & Climate Change, Closed Nuclear Cities Program) developed new magnesium alloys for use in medical devices. The optimum alloying and programmed mechanical-thermal processing for creation of Ultra Fine-Grained structures (UFG) have surpassed all known magnesium-based alloys intended for medical applications in a strength, plasticity and corrosion resistance.

Influence of alloys composition, pressure treatment and heat treatment on mechanical and corrosion properties of new magnesium materials was investigated. The production engineering of semi-product (rods, capillary

tubes, fine wires) of various devices has been developed.

The developed magnesium alloys (three international patents) in UFG condition surpass on strength properties the best commercial alloys applied in medicine (WE43, AZ91D, LAE442, etc.). The plasticity of new magnesium alloys at an ambient temperature reaches 40 %.

Alloys have good foundry capability and high processability index that allows to form of them fine wire, thin-walled tubes and products of an irregular shape.

Due to optimum corrosion resistance in tissues and liquids of living body and mechanical properties, the developed alloys can be used for manufacture of many biosoluble medical products and devices: coronary and peripheral stents, bone implants, staples for endoscopic surgery.



Thin-walled capillary tubes (OD of 1.6 mm, wall thickness of 0.14 mm) and fine (0.15 mm) wire made of the developed magnesium alloys have been manufactured.

The design of stents is developed. Complex testing of mechanical and corrosion properties of new stents and four medical experiments on biocompatibility of new magnesium alloys is carried out.

Positive results during testing on animals have been received. Experiments on check of medical efficiency of new generation of biosoluble stents on the basis of magnesium are being prepared.

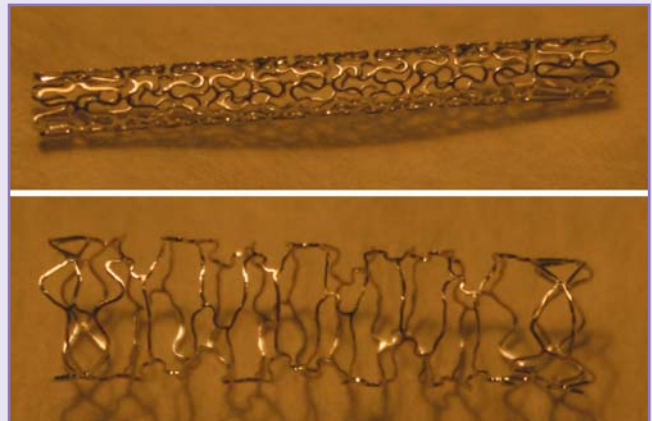


Fig. 3. Magnesium stent in initial and dilated (OD 4 mm) state

Receiving of antigens and monoclonal antibodies with the purpose of using in ELISA test-systems for Aujeszky's disease diagnostics



Total funds allocated: \$ 49,390

Staff at the Institute of Experimental and Clinical Veterinary Medicine in Kharkiv under the **STCU Partner Project P168a “Receiving of antigens and monoclonal antibodies with the purpose of using in ELISA test-systems for Aujeszky's disease diagnostics”** in partnership with the Department of Energy Global Initiatives for Proliferation Prevention Program established an on-campus manufacturing capability for diagnostic kits for Aujeszky's Disease, a serious disease in pigs that is endemic across Eastern Europe. The virus causes reproductive and severe neurological disease in affected animals and is a substantial problem for countries whose agricultural economics rely heavily on swine breeding. The project supported test kit certification and patenting, conducted a market assessment, and supported test kit marketing. The Aujeszky's Disease Test Kits currently are available from the institute on a commercial basis. The project outcome is an effective way to support the agricultural community across the region and a good example of the Institute financial viability.



Targeted Research Program

In 2010, the STCU continued development of its Targeted Research Program (TRP) “Nuclear Forensics”. An important aspect of the program is its relevance to the Recipient Parties (Ukraine, Georgia, Azerbaijan and Moldova) and the Western Funding Parties (Canada, the European Union and the USA) which allowed new sources of funding to be found.



The Nuclear Forensics initiative has two components. First, strengthening the infrastructure capabilities, strengthening regional cooperation with the establishment of a network, establishing reach-back capabilities within each of the Recipient countries and fostering linkages with the European Union laboratories at the forefront of nuclear forensics. Second, S&T development activities (including the development of training materials and measurement scenarios) that will complement the infrastructure work. More specifically, the S&T activities will enable the scientists and institutes in the Recipient countries to acquire needed expertise in order to undertake detailed characterisation of seized material and a comparison of its characteristics with available databases. This is necessary in order to

determine the origin and place of diversion of seized nuclear or radioactive material and to determine its intended use and last legal owner.

In 2010 the STCU, working closely with the Recipient Parties and Western Funding Parties, spearheaded the development of an infrastructure proposal and several S&T projects that are now under consideration for funding in 2011. It is noteworthy that the Recipient Parties have pledged to co-finance (30% contribution) the S&T projects that are selected for funding. STCU's coordination of the activities will help maximise the synergies between the various stakeholders.

Overall, the benefits of the new Targeted Research Initiative are many and include:

- The engagement of “new” government organizations in the Western Donor Parties as potential STCU partners
- An interactive approach for developing project proposals
- Possibility for multiple Parties to co-fund projects
- Recipient Parties making financial contributions to Partner Projects (c.f. the previously established “Targeted Initiatives” program
- STCU's flexibility in being able to respond to initiatives that are of interest and imposed time frames of the Funding Parties

The STCU hopes to develop another Targeted Research Program in the area of environmental forensics.



A major scientific conference of environmental forensics is being organised in partnership with Canada's Department of Foreign Affairs and International Trade, Environmental Canada and the International Science and Technology Centre (ISTC) in Moscow. The conference, scheduled to take place in late summer 2011 will bring together experts from across the former Soviet Union, Canada, the European Union and the USA. It is intended to disseminate environmental forensics information to governments, regulatory bodies, industry and research institutes / universities in order to identify the sources and entities responsible for environmental contamination. Following the conference, the STCU will work with "non-profit" and "for profit" organizations within Western Funding Parties and the Recipient Parties to develop an organized Tar-

geted Research Program for Governing Board consideration, and then follow the same steps as with the Nuclear Forensics Program; pursue development of S&T partnerships that will address areas of concerns to all stakeholders.



Targeted R&D Initiatives

The Targeted R&D Initiatives program completed cycles with Ukraine, Azerbaijan, Georgia and Moldova. All together for 2010, 35 Targeted Initiative projects (totaling approximately \$2.86 million USD equiv) were approved and co-funded (50%-50%) by the STCU and each of the Recipient Parties. For the STCU half of the Targeted Initiatives project co-funding (\$1.44 million USD equiv: \$1.04 million USD plus EURO 302,175), these 35 projects engaged 213 former weapon scientists, along with 128 non-weapon scientists.

- For the sixth completed STCU-Ukraine Targeted Initiative cycle, 12 Targeted R&D Initiative projects were approved. The total amount of STCU funding for these 12 projects was \$358,088 USD plus EURO 183,923, with approximately \$587,995 in matching funds provided by the National Academy of Sciences of Ukraine.
- For the third completed STCU-Azerbaijan Targeted Initiative cycle, 6 Targeted R&D Initiative projects were approved. The total amount of STCU funding for these 6 projects was \$299,361, with \$299,361 in matching funds from the Azeri National Academy of Sciences.
- For the fourth completed STCU-Georgian Targeted Initiative cycle, 11 Targeted R&D Initiative projects were approved. The total amount of STCU funding for these 9 projects was \$255,872 USD and EURO 100,512, with approximately \$381,509 USD in matching funds provided by the Georgian National Science Foundation.
- For the second STCU-Moldovan Targeted Ini-

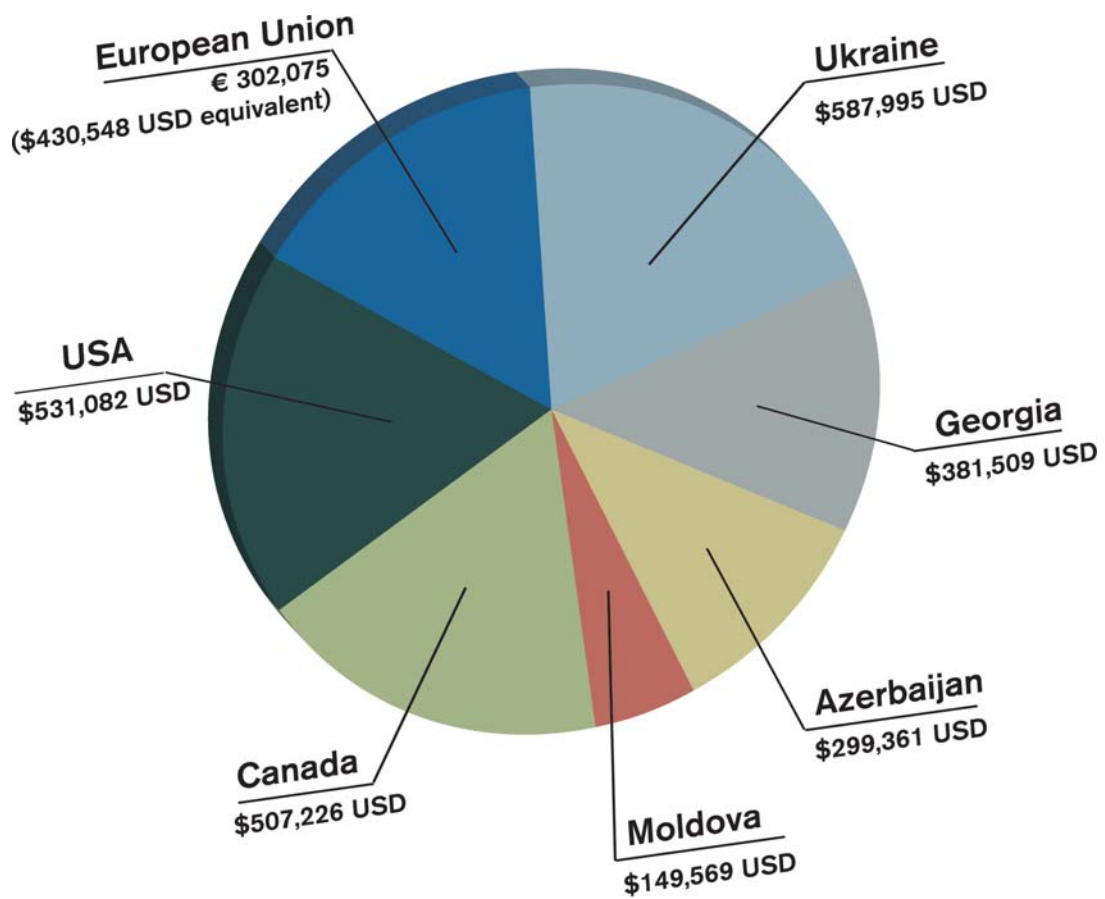
tiative cycle, 6 Targeted R&D Initiative projects were approved. The total amount of STCU funding for these 6 projects was \$149,569 USD, with \$149,569 USD in matching funds from the Moldovan Academy of Sciences.

With the reassignment in 2010 of the Targeted R&D Initiatives program to the Deputy Director Igor Lytvynov (UA) the year was marked with a limited expansion of the Program. A framework agreement has been signed with the National Space Agency of Ukraine, which opens a wide sector of activity supported by the Ukraine. Using funds donated by INTAS a STCU-NSAU Targeted Initiative will begin in 2011.

Barring any major changes in the current approach toward the Targeted Initiatives program, the STCU expects to continue the program as it now stands—annual cycles involving the national science academies or science foundations of Ukraine, Azerbaijan, Georgia, and Moldova—with no major changes in the participants in the program financial targets.



Funding Sources for 2010 Targeted Initiative Projects:



Targeted Initiatives Projects in:
 Ukraine – 12
 Azerbaijan – 6
 Moldova – 6
 Georgia – 11
 Total: 35

Total Amount of Funding:
 STCU = \$1,468,856 USD
 plus Recipients = \$1,418,434 USD

Targeted R&D Initiatives

Nanotechnologies in Medicine



Total funds allocated: \$50,632 from Canada and \$50,632 from Ukraine correspondingly

The STCU interdisciplinary project #4913 “Use of carbon fibers and carbon nanostructures in cell biology and tissue engineering” (completed in August 2010) was carried out in close collaboration of biologists and medical specialists of the Institute for Problems of Cryobiology and Cryomedicine with physical research scientists of National Science Center “Kharkov Institute of Physics and Technology”. Supported by the STCU and National Academy of Sciences of Ukraine, the project was devoted to the development of the catalytic method of production of carbon nanocomposites and further investigation of their biocompatibility with human bone marrow mesenchymal stromal cells (MSC) as well as the cells proliferation and differentiation properties during 3D in vitro culturing.

The project included several logical stages: from screening of the most biocompatible carbon material in vitro and in vivo to the development of tissue engineered cell-carbon chondrogenic structures. At the first stage the optimal catalysts and procedures for carbon structures producing have been chosen with the purpose to provide the best biocompatibility of the carbon catalytic deposits with MSC. The next step was the development of the optimal cell seeding techniques for the effective distribution of cells within the carriers as well as investigation of the growth behavior of MSC during culturing within 3D carbon matrices. At a final stage it was determined the optimal culture conditions for the creation of dense MSC-carbon tissue engineered structure with further differentiation of cells into chondrogenic lineage.

The project results demonstrate the promises of carbon catalytic deposits as three-dimensional scaffolds for cartilage tissue engineering.



Fig. 1. Scanning Electron Microscopy image of carbon catalytic deposits



Fig. 2. Morphology of human bone marrow mesenchymal stromal cells during in vitro cell culture within three-dimensional carbon catalytic deposits.



New Advances in Nanoscience



Total funds allocated: \$16,666 from USA, \$16,666 from Canada, EURO 10,718 from EU and \$49,950 from Ukraine

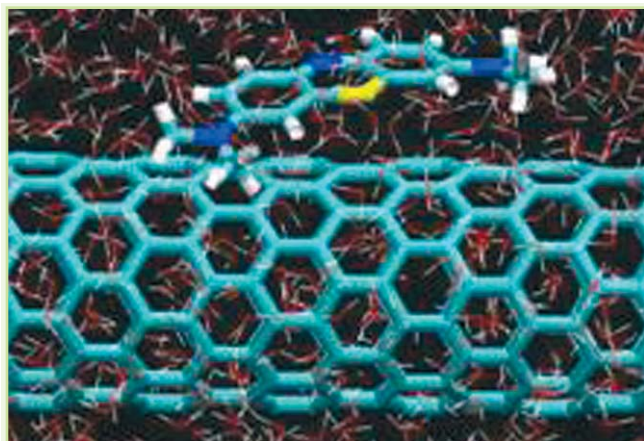


Fig. 1. Molecular dynamics simulation of carbon nanotube - methylene blue dye nanocomposite in water medium.

In the framework of the STCU project #4918 “**Bio-nanocomposites with charge transfer between biomolecules and nanomaterials: development and new mass spectrometric control methods**” (completed in September 2010) collaborative efforts of scientists from B. Verkin Institute for Low Temperature Physics and Engineering of the NAS of Ukraine and O.O. Chujko Institute of Surface Chemistry of the NAS of Ukraine has resulted in the development of the new bionanocomposites and advanced up-to-date powerful mass spectrometric technique for nanoscience and nanotechnology applications.

A set of nanomaterials based on nanoforms of carbon (Fig. 1), mesoporous oxide films, silicon modified by organic and biomolecules has been elaborated and tested for promising applications.

Utilization of nanomaterials in the ion sources permitted to increase the analytical performance of desorption mass spectrometric techniques themselves, in particular to detect some compounds unavailable by traditional approaches (Fig. 2). Combination of various components – titanium and silicon oxides, gold and silver nanoparticles - permitted to produce

mesoporous oxide films which have demonstrated high efficiency in photo-degradation of environmental pollutants.

The revealed property of charge transfer in the composites of nanoforms of carbon with dyes, along with composites of fullerenes with DNA, have positioned them as promising materials for biosensors design. The developed bionanocomposites based on finely dispersed silica modified by proteins in combination with some biologically active compounds have shown high efficiency in their tests as components of media for cryopreservation and deconservation of bovine gamete cells with preservation of their biological activity. Novel mass spectrometric methods of monitoring of elementary steps of nanomaterials functioning on the level of single molecules has been developed, including processes of charge transfer in dye molecules in the course of their reduction, degradation of organic pollutants on mesoporous oxide films, adsorption of biomolecules on modified porous silicon, which provided basic information necessary for further improvement of emerging nanomaterials.

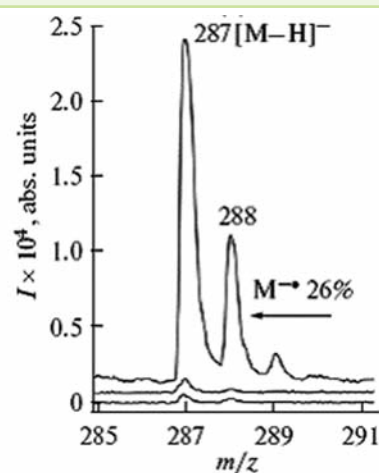


Fig. 2. Dramatic increase of mass spectral signal of a dye obtained with a help of nanostructured graphite (upper line) as compared with traditional materials (below).

Partner Promotion

Partnering Initiative Canada



In 2010, the STCU and the National Space Agency of Ukraine organized a partnering mission to Canada. Participants from the leading Ukrainian aerospace R&D institutes were invited to meet with the Canadian private sector in order to develop Partner Projects. However, the partnering initiative was postponed until 2011.

Throughout the year a number of other partnering initiatives were organized with support from the Canadian Party. The objectives of these meetings were to establish S&T linkages with Canadian stakeholders, to assist the integration of former weapon scientists in the global scientific community and to assist the Ukrainian bio-community with the adoption of international standards in biosafety and biosecurity. The missions included:

- “Biorisk Management Standard” Workshop in Brussels (24th – 25th February)
- “Globe 2010”, Vancouver 24th – 26th March
- “Implementation of Biorisk Management Standards in Microbiological Laboratories”, Serpukhov, Russia, 17th – 19th March
- Biosafety Cabinet “Certification Train-the-Trainer Certification program” Maine 8th – 12th March
- Canadian Biosafety Symposium, Winnipeg, Canada 6th – 9th June
- EBSA Annual Conference, Ljubljana, Slovenia 21st – 23rd June



Partnering Initiative European Union

In the course of 2010, promotion and management of the STCU Partner Program received two modifications. First, its financing was streamlined for the European activities under a new single and all-inclusive Supplemental Budget Line. Secondly, the EU Deputy Executive Director became responsible for the European Union Partners, for managing EU Partner Projects and for developing new contacts through prospecting actions.

Using the Spanish and later Belgian EU Presidency pe-

riods, the 2010 budget forecasted for use from the remaining Travel Support (Sweden) Supplemental Budget Line, and continuous dialogue with European Commission Directorate General for Research, Euratom Directorate (FP7 - Euratom), a series of targeted missions were conducted in the areas of Nuclear Energy, Space, Material Sciences, Biotechnologies, Information Technology/Softwares, and Renewable Energies (Solar – Wind to Hydrogen). Several partner agreements resulted from these initiatives, with on-going further developments.

Nordic Innovation Initiative 2010

On 8 – 10 September 2010, under STCU-Swedish cooperation, an event aimed to connect Eastern European scientific capabilities, with needs from Swedish Enterprises was organized at the Lindholmen Science Park in Gothenburg.



On the first day, a workshop meeting followed by thematic presentations from Ukrainian selected scientists and representatives from EU-funded Project JSO-ERA Project (Joint Support Office for Enhancing Ukraine's Integration in EU Research Area) on technology development, and EU-funded Support to Knowledge-based and Innovative Enterprises and Technology transfer Business Project on technology transfer was conducted.

Also bilateral meetings by Ukrainian scientists with their identified Swedish collaborators were held at Lindholmen Science Park, at the Chalmers University at the research facilities of the University of Gothenburg.

Partner Promotion

World Bioenergy 2010 Conference & Exhibition for Energy

Dr. Georgiy Geletukha, Institute of Engineering Thermophysics, and Dr. Tetiana Zheliezna, Scientific Engineering Center “BIOMASS” presented “Bioenergy in Ukraine: state of the art and prospects for the development” during World Bioenergy, 24-28 May 2010. To foster matchmaking, the event included visit tours to Sweden’s largest combined heat and power plant fuelled by forest residues, Linkoping biogas plant and a small recently built district heating plant fuelled by wood pellets, to a peat production area, biogas production and upgrading plant with sewage sludge as a feedstock, and a plant which produces biogas from the mixture of food waste and agricultural residues. Discussions were held with: Fundacion Instituto Valenciano de Tecnologia, Spain ;LTC AB;Sweden Wastec AB; Sweden, AB Bruzaholms Bruk, Sweden;AB



Torkapparater, Sweden, Allan Bruks AB, Sweden Ekman & Co AB, Sweden Innovation Center for Bioenergy and Environmental Technology, Denmark.

Technical Meeting on Fission Cooperation

At the Initiative of European Commission Directorate General for Research Units on Fission and on Euratom International Agreements, an Ad’hoc Technical Meeting on fission cooperation was organised in the frame of the Euratom-Ukraine relations. Directorate General for Aid Cooperation Nuclear Safety Unit also joined to host Academician Ivan Karnaukhov, Deputy Director National Science Center at Kharkov Institute of Physics & Technology, National Academy of Sciences of Ukraine, Professor Volodymir Pavlovitch of the Kyiv Institute for Nuclear Research, Head of Nuclear Reactor Department, and Ms Iryna Makarenko, Diplomat, from the Mission of Ukraine to the EU. STCU sponsored the Ukrainian travellers coming with an aim to



see a potential Targeted Initiative result from the discussions of 6 July 2010.



Partnering Initiative United States

Establishing Commercial Business within GIPP Sustainability Support Projects

In 2010 STCU staff managed four sustainability support projects for Ukrainian institutes in support of the U.S. Department of Energy/National Nuclear Security Administration's Global Initiatives for Proliferation Prevention (GIPP) Program. GIPP funds collaborative R&D projects involving Ukrainian and regional institute scientists, U.S. National Laboratory scientists, and U.S. industry partners. These partnerships result in innovative technology solutions that address global priority areas such as nonproliferation, counterterrorism, energy



and medical technologies. The follow-on sustainability efforts at STCU provide additional support to the institute development teams in the form of market studies, intellectual property assistance, and industrial and quality control certification, with the goal of establishing commercial activities. Projects are selected based on their commercial promise, market readiness, leadership and institute support, and the extent to which there is a viable pathway to successful business. STCU staff supported project implementation by participating in the planning sessions held by U.S. National Laboratory experts, and issuing and managing contracts to do the work.

Descriptions of STCU's 2010 Commercialization Projects

1. The project team at the Kharkiv Institute of Physics and Technology (KIPT) implemented almost all of the infrastructure and certification activities necessary for production and supply of a short-lived radioactive isotope ($Tc99m$) for diagnostic testing of humans. KIPT now has a provisional license for isotope production, and has conducted successful pre-clinical trials. KIPT will pursue clinical trials as the final hurdle to commercial production.
2. Staff at the Zabolotny Institute for Microbiology and Virology in Kyiv established an in-house manufacturing capability for its Avercom pest control technology, and will combine it with plant growth regulators developed by Agrobiotech to provide a potent seed treatment and crop application mixture. This effort required business planning support, certification services, and initial marketing. The combined product will be available in September 2011.
3. The project team at the Institute of Metal Physics (IMP) in Kyiv has conducted market assessments and developed business plans for commercializing its Hydrogenated Titanium Powder [HTP] technology. Titanium parts manufactured through the HTP technology generally have more desirable characteristics and lower costs than products produced through the conventional ingot process. The business plans cover large scale part production suitable for supplying the aerospace and automotive industries, and a small Metal Injection Molding facility on the IMP campus suitable for production of low-volume, high-value products like medical and dental implants.

Partner Promotion

Probiotics Conference in Yerevan, Armenia sponsored by US Department of Energy GIPP Program

The Probiotics Conference was sponsored by the US Department of Energy Program GIPP and organized by ISTC and STCU in Yerevan, Armenia, 5-7 October 2010. Scientists from Armenia, Georgia, Kazakhstan, Kyrgyz Republic, the Russian Federation, Tajikistan, and Ukraine participated with international health care science and biotechnological industry from US, Canada, and Japan to share their vision of the current developments in probiotics. More than 40 former weapons scientists and experts participated in the conference including scientists invited by the STCU from

- Institute of Microbiology and Virology in Kyiv,
- Institute of Bio-Colloidal Chemistry in Kyiv, and
- Mechnikov Anti-Plague Research Institute in Odessa, Ukraine

The purpose of the meeting was to share experiences of each Institute in the field of biotechnologies and health, and to promote further collaboration between US and CIS country institutes. During the conference GIPP staff described the ways to participate in the



GIPP program for scientific support in this important area. After the event, many promising contacts and proposals are being developed. Three possible projects in probiotics research are now being developed for the GIPP program. Probiotics specific health effects are being investigated and documented including alleviation of chronic intestinal inflammatory diseases, prevention and treatment of pathogen-induced diarrhea, urogenital infections, atopic diseases, and others.

Renewable Energy Technology Exhibition in Washington, DC

STCU organized a delegation of scientists from Ukraine to participate in the Renewable Energy Technology Exhibition which was held 3-5 February 2010 in Washington, DC. Taking into account the acceleration of Earth's climate change (G8 Summit key issues) and

understanding of this problem's importance, CIS scientists have much to contribute to this important area. Four Ukrainian scientific experts participated in the event from the following institutes:



- Institute of Semiconductor Physics in Kyiv
- Institute for Problems of Materials Science in Kyiv
- Institute of Engineering Thermophysics in Kyiv
- State Enterprise Design Office “Yuzhnoye” in Dnipropetrovsk

STCU exhibited posters, video presentation, multimedia presentation, and brochure for this event. Arrangements on further contacts have been achieved to use scientific potential of Ukrainian scientific organizations in developing solar elements and solar concentrator systems and other aspects related to renewable energy research.



STCU took part as an exhibitor in MEDICA-2010 International World Trade Fair of Medicine with Congress on 17-20 November 2010 in Duesseldorf, Germany

As the world's largest medical trade fair accompanied by a congress, this year's MEDICA once again offered a comprehensive overview of a wide variety of innovations in the world of medicine. This leading medical fair gives decision makers from around the world the opportunity to find out about the latest developments in



their field, take the opportunity for intensive professional development, and to discuss their field of specialization. Of about 146,000 visitors who attended this year, almost half came from abroad.

On MEDICA, STCU booth offered technology profile forms, presentations related to STCU Partner Program, and promoting materials of Dr. V. Sosnytsky's new supersensitive magneto-cardio-graphic system for early recognition, precise diagnostics and monitoring of heart diseases.

During the International Trade Fair useful business contacts were established with such companies as Philips, Alliance Biomedica Group, American Diagnostic Corporation, Target Medicine corporation, ProVitaTec, NetMedical.

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STCU Annual Report 2010

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