出國報告（出國類別：國際會議）

2010 年度台俄雙邊科技年會及聖彼得堡與喀山地區開拓訪問

服務機關：行政院國家科會委員會
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報告日期：99 年 09 月 03 日
出國時間：99 年 05 月 29 日 ~
99 年 06 月 05 日

摘　要

陳副主委正宏於 99 年 5 月 29 日至 6 月 5 日率團赴俄羅斯主持台俄（NSC-RFBR）年度會議及開拓訪問業已圓滿順利完成。

此行主要與俄羅斯基礎研究基金會（RFBR）進行年度會議，重要決議事項包括爲重新簽署雙方合作協議附約，於附約中議定雙方 2011-2013 年共同補助合作計畫與研討會之各階段作業機制與費用分擔；議定本年度計畫與研討會之計畫補助案，經比對雙方初審結果與討論，雙方共同擇定 14 件跨領域合作計畫、17 件一般型合作計畫及 7 場研討會申請案；雙方同意合作推動在東亞地區之多國（如台、俄、日、韓）合作等。

除舉辦年度，陳副主委次行亦拜會俄羅斯 Ioffe 理工學院、Kulchatov 研究院及國立礦業大學等，受訪單位均表達與我國合作之意願，並與本會討論可合作主題。並於喀山參加俄羅斯科學院“Innovation of RAS-2010”論壇，在來自各市研發單位、甚至芬蘭等地學者代表之會議上就台灣科技研發成就與台俄研究現況給予簡報，獲得與會者極大回響，其後該院提出與本會進行創新合作並簽署合作協議之可能性。

目次

壹、緣起及目的

本會與本會與俄羅斯基礎研究基金會（Russian Foundation for Basic Research, RFBR）雙方合作已邁入第 6 年度，依雙方規劃應於 3-4 月各自進行計畫及研討會審議程序，5 月初交換初審意見進行比對，並於 5 月份召開雙方合作年會，除就申請案進行評議討論，選定補助計畫，議定基金分擔，討論合作改進方案及提出新合作構想，同時須議定並簽署雙方第 3 次之 3 年期（2011~2013）台俄合作基金附約；另，依雙方年會輪流辦理原則，今年度應於俄羅斯召開。

本年度係俄方首度主動規劃在俄訪問之活動，將全程安排本會代表團在莫斯科及聖彼得堡兩市之參訪，同時因時值俄羅斯第三大城喀山科研活動旺季，該基金會極力推薦我方此次能順道前往參與俄羅斯科學院於該地舉辦之“Innovation of RAS-2010” 論壇。

此外本會於 98 年度設立「補助任務導向型團隊赴國外研習試辦方案（簡稱龍門計畫）」，考量俄羅斯爲科技大國，尤其是基礎科學實力雄厚，值得我方年輕研究人員借境學習之處甚多，是以擬參訪重要科研單位，探訪適當之合作機構。

貳、過程

甲、　訪問行程

May 29, Saturday 22.20	抵聖彼得堡 Pulkovo 機場 （KE 929/ 17:45 ICN - 22:20 LED） 下榻旅館 “Smolninskaya" Hotel (http://www.smolninskayahotel.com/en/index.html).
May 30, Sunday 09.45 – 10.30 10.30 – 11.00 11.00 – 14.00 14.00 – 15.00 15.00 – 16.00 16.30 – 17.00 17.00 – 18.00 20.00	市政參訪 — 彼得霍夫 (http://peterhofmuseum.ru/index.php?lang=eng). 1. Transfer from the hotel 2. Boat trip to Peterhof. 3. Walk around the Low Park and visit to the Grand Palace. 4. Lunch at the restaurant «Standart» (in the Low Park). 5. The Special Treasure. 6. Boat trip to St.–Petersburg. 7. Transfer to the hotel. 8. Guided walk around the city.
May 31, Monday 10.00 – 13.00	拜會行程 1. 國立礦產大學 Saint-Petersburg State Mining Institute (Technical

	University) and Mineral Museum, 校長 Prof. Vladimir Stefanovich Litvinenko (http://oldwww.spmi.ru/skeleton_en/2/549)
14.00	2. 科學院聖彼得堡研究中心科學暨教育中心 Center for Science and Education 主任 Zhores Ivanovich Alferov 院士 (http://edu.ioffe.ru/noc_main.html; http://nobelprize.org/nobel_prizes/physics/laureates/2000/alferov-autobio.html)
15:00	3. Ioffe 理工學院 Ioffe Physical technical Institute 院長 Andrei Georgievich Zabrodskii. (http://www.ioffe.ru/index_en.html)
19.45	4. 傍晚搭 Sapsan 高速火車返莫斯科
23.40	5. 下榻旅館"Soyuz" Hotel.
June 01, Tuesday	國科會-俄羅斯基礎研究基金會年會
10.00 - 10.30	1. 致詞 («Rotonda» Hall, 3rd floor).
10.30 - 13.00	2. 台俄計畫主持人報告 («Rotonda» Hall, 3rd floor).
13.00 - 14.00	3. 午餐—RFBR 主席 Panchenko 院士主持
14.00 - 16.00	4. NSC- RFBR 科研補助年度會議 (Room 2127, 21st floor).
19.00- 21.00	5. 晚餐—駐俄代表處陳俊賢代表主持
June 02, Wednesday 10.00 – 17.00	拜會行程 1. 科學院結晶學研究所 The Shubnikov Institute of Crystallography of the Russian Academy of Sciences (IC RAS), 所長 Mikhail Valentinovich Koval'chuk 通訊院士 (http://www.crys.ras.ru/indexe.html). 2. 庫恰托夫研究院 同步輻射中心 生醫化學所 The RRC "Kurchatovsky Institute 院長 M.V. Koval'chuk 通訊院士 (http://www.kiae.ru).
22:45 – 00:15+1	搭機前往喀山（U9 367/22:45 DME – 00:15+1 KZN）
June 03, Thursday	抵達喀山 下榻.Hotel «Mirage». http://www.mirage-hotel.ru/lang/en
10.00 – 13.00	參加俄羅斯科學院“Innovation of RAS-2010”論壇

	Presentation on recent S&T development in Taiwan at the conference "Russian Academy of Sciences" innovations 2010" and participation in a round-table discussion on Innovation Systems in Russia and Taiwan".
14.00 – 18.00	拜會行程 1. 喀山理工學院 Zavoisky Physical-Technical Institute (ZPhTI) 所長 Kev Minnulinovich Salikhov http://www.kfti.knc.ru/eng/index.html 2. 有機及物理化學所 Institute of Organic and Physical Chemistry 所長 Oleg Gerol'dovich Sinyashin http://iopc.knc.ru/. 3. 喀山科技大學（喀山圖伯列夫航空學院）Kazan State technical University (Kazan Aviation Institute named after Tupolev) http://www.kai.ru
19:00	歡迎晚會
June 04, Friday 9.00 – 11.00 14:15 – 15:45 20.40 – 09:55+1	市政參訪 搭機返回莫斯科 Domodedovo 機場（U9 364/ 14:15 KZN – 15:45 DME） 自莫斯科 Sheremetyevo 機場返台（KE 924/ 20:40 SVO – 09:55+1 ICN）

乙、2010 年 NSC-RFBR 台俄基金年會

RFBR 成立於西元 1992 年，係俄羅斯聯邦政府下最大基礎研究補助單位，其支持學術發展的功能與本會相當；依學門分爲數學、資訊科學及力學，物理與天文學，化學，生物及醫學，地球科學、人文科學及工程科學等七個學術部門，2009 年度預算爲 68 億盧布（約合 75 億新台幣；2008 年爲 66 億盧布，則較前年增加約 23%），用來補助研究計畫、公用儀器、研討會、出版品等十一項競賽活動。此外，基金會自 2004 年起在基礎科學研究之補助之外，新增加一項「目標導向型計畫（goal- oriented project）」，專門補助能將研究結果運用於產業、創造

經濟價值之計畫，並於本(2009)年度選定 15 項國家優先推動之跨領域主題，並邀請我國學者共同參與合作研究。

由於本會與俄羅斯基礎研究基金會雙方的關係已建立多年，本項基金合作也已進入第六年度，平時本為駐俄羅斯科技組與其聯繫密集，經常會面或溝通，整項合作運作良好，雙方具有相當共識，因此年會的進行十分順暢；此外基金會本年度首度參考本會安排年會模式，邀請俄方計畫主持人到會給予進度或結案報告，下午才進行新年度之申請案審議。議程如下表：

Time	Content	Remarks
10.00 - 10.30	Opening Remarks 1. Dr. Panchenko Vladislav Yakovlevich **(Co-chairman)** Chairman of Board, RFBR 2. Dr. Chen Cheng-Hong **(Co-chairman)** Deputy Minister, NSC	
10.30 - 13.00	Reports of PI's of the Taiwan-Russia Joint Research Projects	
13.00 - 14.00	Lunch, hosted by Dr. V.Y. Panchenko	
14.00 - 16.00	Closed Session 1. Joint Review on Proposals 2. Discussion on Cooperation Mechanism 3. Signing of Amendment to Agreement and Protocol	
19.00- 21.00	Dinner, hosted by Mr. Antonio Chen, Representative for the Representative Office of Taiwan in Moscow	

在下午之計畫審查案，本年度爲首次開放兩種計畫類型：

A. 「跨領域主題」類型—計有 3 大主題含 16 項子題【請參附錄】；僅擬合作研究內容與主題相符者得提出計畫申請；每件計畫 **1,000,000NT/年** （俄方 1,000,000Rb/年）。
B. 「年度優先推動領域」類型—計有 6 大領域 14 項重點【請參附錄】；只供參考，但不以爲限，非屬重點項目者亦可提計畫申請；每件計畫 **20,000 美元/年** (俄方亦同)。

此次 A 類計畫 23 件、B 類計畫 43 件申請案，研討會爲 12 件申請案，經將雙方初審結果完成彙整與比對，並製作成簡單易懂的對照表，在推薦的三項等級中（優先推薦、推薦、不推薦），最後雙方共同擇定 14 件跨領域合作計畫、17 件一般型合作計畫及 7 場研討會申請案。

因本會與基金會於 2004 年簽署此項合作協議附約是以 3 年爲期，並於 2007 年於年會中亦於會議紀錄中明訂雙方持續本項共同基金之合作，爲期 3 年，至本年度將期滿，是以再度於會中議定於 2011-2013 年之雙方合作，並簽署了第 3 次的合作附約。

晚上則由我駐俄羅斯代表處陳代表俊賢作東宴請雙方單位與會人員，作爲慶功宴，並表現其對台俄之間科技合作之高度支持。

丙、俄羅斯科學院“Innovation of RAS-2010” 論壇

陳副主委率同仁首次造訪此次訪問的最後一站--喀山，參加俄羅斯科學院所舉辦的"Innovation of RAS-2010"論壇，並在來自各市研發單位、甚至芬蘭等地學者代表之會議上就台灣科技研發成就與台俄研究現況給予簡報，獲得與會者極大回響；該院積極展現其與本會共同簽署合作協議以進行創新合作之極大的意願。

丁、俄羅斯科研機構之合作開拓

一、國立礦產大學介紹

St. Petersburg State Mining Institute consists of 7 faculties: Geological Prospecting Faculty, Mining Electromechanical Faculty, Mining Faculty, Metallurgical Faculty, Economics Faculty, Faculty of Humanities and 35 departments.

St. Petersburg State Mining Institute's research enterprise is extremely diverse as the Institute is the oldest and the most established technical training and scientific research institution in the Russian Federation and one of the oldest in Europe. Over the years the Institute has built a strong reputation for research in one of the most important sectors for any state- natural resources and energy. The scope of the

research conducted here reflects the Institute's strategic research thrusts in the areas of civic institutions; advanced technologies; advanced materials and structural science; the life sciences; and modern culture. Research at the Institute is also contributing to competitiveness and productivity. Our commitment to technology development and commercialization has resulted in patents, licenses and partnerships that are integral to the success of the Russian products.

St. Petersburg State Mining Institute International Office provides a Focus for International Partnerships and Joint Ventures:

Participation in global activities is a necessary condition for a national university like St. Petersburg Mining Institute (the Institute) and since its creation in 1773 the Institute has provided initiatives leading to a wide range of international partnerships and joint ventures. This office is the principal point of contact between the Institute and the international community. The objectives of the office are as follows:

To promote the teaching and research activities of the Institute through the involvement of faculty, staff, students and alumni in international activities;

To advance public awareness and understanding of global issues and strengthen the Institute’s international opportunities and involvement, especially taking into consideration one of the main areas of our research the energy sector that has become one of the most important issues in the world today.

To meet its objectives, the Institute’s International Office imperatives are as follows:

To provide support, advice and assistance to the academic and administrative units of the Institute to facilitate internationalization in their respective spheres;

To serve as a resource center for information and for professional expertise pertaining to international opportunities, programs, projects and related activities;

To stimulate involvement in and encourage the development of projects and other activities relevant to internationalization at the Institute, in concert with institutional academic strategic priorities and in co-operation with other institutions and organizations as appropriate;

To serve as the focal point for the Institute’s relationships with international agencies, organizations and business enterprises at the local, regional, national and international level. This will include the review, co-ordination and administrative approval of proposals and budgets for international activities, including international research proposals/projects to be undertaken in the name of the Institute that are being submitted for external funding. In co-operation with academic and administrative units, the Institute’s International Office will also assist in the negotiation of international projects with domestic and/or international agencies;

To ensure the effective negotiation and management of the Institute's academic linkage agreements with international institutions and foreign governments, including linkage agreements for joint research projects, and faculty and student exchanges. Internationalization is an integral part of the Institute's mission, and an important part of the Institute's academic fabric and fundamental character. Important changes in the world's structure that followed the process of globalization have a great impact, especially in the natural recourses and energy sector. The Institute, being one of the most important academic institutions providing training in these areas has a commitment to the universal ideas of cooperation and collaboration and aims to become a meeting place for everyone sharing our ideas and goals.

Research and Education Center REC-015 Research and Educational Center REC-015 was established on the basis of long-term research activities of the leading scientific schools of the oldest Higher Technical Institution in Russia – the St. Petersburg State Mining Institute (Technical University)**.** Its foundation was the result of application of state-of-the-art technology to research activities as well as integration into the world's research and educational system and collaboration with foreign partners. The REC-015 was set up with the support from the U.S. Civilian Research and Development Foundation (CRDF) (grant ST-015-02 from October 1st, 2002), MacArthur Foundation and the Ministry of Education of the Russian Federation. The Center embraces over 20 research and educational laboratories which occupy the total area of more than 1,500 sq. meters.

The Center carries out research activities in the following lines of investigation:

- Basic research of indicator minerals of petrogenesis and ore genesis;
- Basic research in rock transformation in areas of intensive technogenesis;
- Geochemical and geoecological studies of rocks and mineral waste in technogenic zones.

The main objectives of the Center:

- Development of theoretical grounds for compositional and property analysis of indicator minerals and aggregates to solve tasks of petrogenesis and ore genesis as well as rational use of mineral resources and environmental protection;
- Development of genetic-geological models of large and unique deposits based on isotope geochemical analyses;
- Simulation of structural formation processes in aggregates, rocks and ores, soils and waste;
- Studies of distribution and migration of toxic elements in mining areas;
- Engineering-geological and geo-ecological grounding of engineering construction stability in megalopolises;

The Research and Education Center is supplied with state-of-the-art equipment and instrumentation of leading Russian and foreign producers:

- A scanning electron microscope and microanalyzer JXA8600S by the JEOL company (Japan);
- An atomic absorption spectrometer AAS5EA by the Analytik Jena company (Germany);
- A roentgen fluorescent spectrometer ED2000 by Oxford Instruments (Great Britain);
- A spectrophotometer UV-VIS Specord200 by the Analytik Jena company (Germany);
- A sample preparation line by the Buhler company (Germany).

The REC-015 equipment enables the following:

- to analyze structural and chemical peculiarities of indicator minerals of petro- and ore genesis;
- to study microinhomogeneities of ores and their products to optimize concentration and metallurgical treatment processes;
- to determine the following:
- heavy metal, sulfur and chlorine content in oils and oil products;
- metallic content in different solid substances (rocks, minerals, ores, soils, animal and vegetable substances, alloys, construction materials, etc.)
- heavy metal content in natural and industrial waters.

Research and Education Center REC-015 is:

- All-round support for young researchers;
- A unique research and scientific laboratory basis;
- State-of-the-art equipment by the leading producers;
- Advanced research methods;
- Highly qualified personnel;
- Rapid, automated and high-quality analyses;
- Modern commutation network and high level of training and research computerization;
- Integration in international educational system;
- Wide business and research connections with largest Russian and foreign industrial enterprises.

二、科學院聖彼得堡研究中心科學暨教育中心簡介

The Academic University was founded in 1997 as Research and Education Centre of the Ioffe Institute in order to integrate science and education in the field of physics and information technologies. It was initiated by director of the Ioffe Institute,

vice-president of the RAS Zhores I. Alferov, who has been its head up to the present. Today Zhores Alferov is the Rector of the Academic University. Integration is a major condition of survival of modern science and education today. The idea of tripartite "composition" of the Academy of Sciences, Academic University and Gymnasium was proposed by Peter the Great as far back as the Academy's foundation.

Three centuries later it at last came true in centre for research and education of the RAS — the institution, which united institutes and laboratories of the Academy, Academic departments and a Lyceum "Physical-Technical School". Training senior school, university and post-graduate students in direct contact with active scientists, who teach them not only at lectures and seminars but also in the laboratories is in line with advanced world tendencies of training scientific brainpower; it creates necessary prerequisites for Russia to retain its leading position in scientific and technical progress in the 21st century. The system of scientific staff training long ago invented by Abram Ioffe was constantly improved, and after the establishing of the Research and Education Centre — today the Academic University — it became complete. The Academic University closely cooperates with the Faculty of Physical Science and Technology of the State Polytechnical University, which is a successor of the physical-mechanical faculty created by Abram Ioffe in 1919, and the Department of Optoelectronics of St Petersburg Electrotechnical University, established in 1973 by Academician Zhores Alferov. These institutions are partly accommodated at the territory of the Academic University. The new buildings of the Academic University are equipped with everything necessary for giving classes and holding conferences of different scale on the most up-to-date level (local computer network with the Internet access, equipment for presentations). The Academic University also has large room for expositions, a big and a small conference hall, and a hall for theatre performances. There is also a sport complex for "active" rest at the disposal of the students and the staff, which includes a swimming-pool, a playground, an indoor tennis court, and a gym.

The activities of the Academic University mainly include:

- Fundamental and applied research, technological, manufacturing and design projects;
- Research and educational activity in various fields of general and applied physics, astronomy, nuclear physics, quantum and solid-state electronics, biophysics, biochemistry, physiology and experimental medicine;
- Improvement of the "integrated" system of continuous education (senior school–higher education–post-graduate studies–doctoral studies), which provides training skilled professionals within united research-educational network.

The main divisions of the Academic University are the following:

- **Nanotechnology Centre** headed by the First Vice-rector for science and education of the Academic University, corresponding member of the RAS Alexander A. Gorbatsevitch;
- **Higher Education Centre** headed by the Vice-rector for higher education of the Academic University, corresponding member of the RAS Alexey E. Zhukov;
- **Basic Education Centre** headed by the Vice-rector for basic education of the Academic University Mikhail G. Ivanov.

The Centre cooperates in its research and educational activity with the following organizations:

- Ioffe Physical-Technical Institute of the RAS (Ioffe Institute);
- Scientific Engineering Centre for Microelectronics of the RAS;
- B.P. Konstantinov Petersburg Nuclear Physics Institute RAS;
- St Petersburg State Polytechnical University;
- St Petersburg Electrotechnical University;
- Institute of Cytology RAS;
- Institute for Analytical Instrumentation RAS;
- Library of the RAS.

The Academic University has held about 100 conferences on the issues related to various branches of science. They include Russian-French workshop on nanosciences and nanotechnologies, St Petersburg international seminar on nanobiotechnologies, international conference “Beam injection assessment of microstructures in semiconductors”, international conference “Amorphous and microcrystalline semiconductors”, All-Russian conference “Gallium, indium and aluminum nitride”, All-Russian youth conference on semiconductor physics, All-Russian workshop “Heterostructure microwave electronics”, and others.

Since 2005 the Academic University (under its former name) has been one of the organizers of the international symposium “Nanostructures: Physics and Technology”, which rating in Russia and abroad is very high. The symposium is co-chaired by the Laureates of the Nobel Prize in physics Leo Esaki and Zhores Alferov.

It has become traditional for the Academic University to participate in organizing the Nobel Prize Laureates meetings in St Petersburg. It was among the organizers of the International Symposium “Science and Mankind Progress” in 2003, International Symposium “Science and Society” in 2005, St Petersburg Scientific Forum “Science and Society. Nanotechnologies: research and education” in 2008, St Petersburg Scientific Forum “Science and Society. Information Technologies” in 2009.

Since September 2008 the Centre has been conducting regular St Petersburg workshop on nanotechnologies. The workshop is headed by Academician Zhores Alferov, the academic secretary is Professor Vladimir Dubrovskii.

In 1919 Abram F. Ioffe initiated integration of science and education aimed at preparing highly skilled professionals for modern high-technological industry by organizing physical-mechanical faculty at the Polytechnical Institute (closely connected with the Physico-Technical Institute). The process continues today at the Saint Petersburg Academic University — Nanotechnology Research and Education Centre of the Russian Academy of Sciences created by Academician Zhores I. Alferov.

Here the idea of tripartite "composition" of the Academy of Sciences, Academic University and Academic Gymnasium proposed by the founder of our city Peter the Great in the decree on creation of the national Academy at last came true.

Educating senior school and university students and post-graduates in direct contact with active scientists, who teach them not only at lectures and seminars but also in the laboratories is an essential way of training scientific brainpower, which will let Russia retain its leading position in scientific and technical progress in the 21st Century.

- of inorganic nanostructures, design of constructions with biological molecules for highly effective targeted systemic influence on biochemical processes in living cells;
- Theoretical calculation, computer modeling and experimental research into quantum parameters of association-dissociation of organic and inorganic molecules with the use of mass spectroscopy, nuclear magnetic resonance, proton acceleration, and atomic power microscopy methods;
- Development of nanoheterostructure semiconductor biosensors, particularly nanowire-based, for high-resolution physical registration of biochemical processes and major functional properties of living cells.

The laboratory is aimed at the development of theoretical base and new diagnostic devices for high-precision detection of molecular changes and intermolecular interaction in living cells; design of biocompatible materials for transplantation of organs and tissue, as well as medical nanoproducts and new physical methods of targeted influence on major physiological and pathological processes in human organism.

三、Ioffe 理工學院介紹

The Ioffe Institute is one of Russia’s largest institutions for research in physics and technology with a wide variety of operating projects. It was founded in 1918 and run for several decades by Abram F. Ioffe. So it is quite natural that the Institute bears the

name of this outstanding scholar and organizer. The Institute is affiliated with the Russian Academy of Sciences.

四、科學院結晶學研究所簡介

The Shubnikov Institute of Crystallography of the Russian Academy of Sciences (IC RAS) was officially given the name of its founder and first director, Full Member of the USSR Academy of Sciences Professor Aleksei Vasil'evich Shubnikov, in 1971. In 1969, the Institute was awarded the Order of Red Banner of Labor.

The Institute is located in Moscow in buildings on Leninskii pr. 59 and ul. Butlerova 17a and has a division (Research Center for Space Materials Science) in the city of Kaluga.

The Institute Management and its departments are located in the Main Building. Research is traditionally performed along three main directions-crystal growth, crystal structure, and crystal properties. Recently, great attention is also paid to developing the scientific program and the mathematic apparatus and methods for using synchrotron-radiation sources located in the Moscow oblast for structural studies of various organic and inorganic materials.

The information on the Institute of Crystallography is given in two languages — Russian and English. These two versions are not always identical, but both provide the same information on the major research directions and achievements of the institute. The Internet site allows one to get acquainted with the institute structure, its history and achievements, and its major publications. One can also find information on the international cooperation of the Institute and its participation in the organization of various scientific conferences and seminars. The Section «News» (currently in Russian) provides the recent data on current and planned closely related to the Institute's research and activity. There you also can use the Message board to arrange your own information or take part in discussions carrying at the Institute Phorum

The Institute of Crystallography performs research along three main directions:

Crystal Growth: the study of the processes of crystal formation and crystal growth, the development of methods for synthesizing crystals and designing corresponding apparatus

Crystal Structure: the study of ideal *atomic* and real *defect* crystal structures.

Crystal Properties: the study of symmetry and physical properties of crystals, search for crystals with valuable properties.

Priorities:

- The search for new crystals and structures with preset properties and the development of methods of their growth.

- Interaction of the X-ray and the synchrotron radiation, electrons, and neutrons with condensed media. Development of methods for studying structure and properties with the use of synchrotron radiation.
- Biological materials science (methods for synthesizing, crystallization, and studying structures and properties of biological objects) and organic systems.
- Space materials science.
- Surface, subsurface layers, interfaces, and thin films. Synthesis, study of structures and properties, development of methods for crystal diagnostics.
- Innovation activity in the field of crystal growth and designing apparatus for crystal growth and X-ray studies.
- Designing of equipment for the above priority researches.
- Preparation of scientific staff for research in modern fields of crystallography and crystal physics.

scientific structure

GROWTH

Department of High-Temperature Crystallization:
laboratory of
- High-Temperature Crystallization,

sector of
- High-Rate-Grows Methods.

Department of Crystallization from Melts:
laboratores of
- Acoustooptics and Acoustoelectronics,
- Fluoride Materials.

Department of Crystallization from Solutions:
laboratory of
- Crystallization from High-Temperature

STRUCTURE

Department of X-ray Methods for Modern Organic and Inorganic Materials Science:
laboratores of
- X-ray Optics and Synchrotron Radiation,
- Protein Crystallography,
- Small-Angle Scattering,
- Diffractometry of Crystalline Layers,

sectors of
- Reflectometry,
- X-ray Topography.

Department of Electron Microscopy:
laboratores of
- Electron Microscopy,
- Electron Diffraction.

Department of X-ray and Neutron Diffraction Analyses:
laboratores of
- X-ray Diffraction Analysis,

PROPERTIES

Department of Crystal Physics:
laboratores of
- Theoretical Studies,
- Electric Properties of Crystals,

sectors of
- Crystal Optics,
- Optics of Nonlinear Materials.

Department of Track Membranes:
laboratory of
- Nuclear Filters.

Laboratores of
- Liquid Crystals,
- Mechanical Properties of Crystals,
- Resonance Methods,
- Physics of Lasing Crystals,
- Physics of High Pressures,
- Physics of Optical Crystals.

Solutions,
sector of
- Solid Electrolytes.

Laboratory of
- Crystallization from the Gaseous Phases.

Group of
- Molecular Beam Epitaxy.
- X-ray Diffractometry,

sector of
- Neutron Diffraction Analysis.

Group of
- Scanning Probe Microscopy.

Basic Achievements

Theory of Symmetry, The theories of antisymmetry, similarity symmetry, and color symmetry groups were developed.

Structure

The atomic structures of several hundreds of materials were determined by modern X-ray, electron, and neutron diffraction methods from numerous minerals to the structures of biologically active crystals and macromolecules, and, first of all, of proteins. The imaging theory and the method of three-dimensional reconstruction from electron microscopy data were developed. The independent method of electron diffraction structure analysis was developed. The methods for studying structures of surfaces, thin films, and multilayer systems were developed including the structure-sensitive method of X-ray standing waves. First Russian diffractometers, X-ray cameras, multicrystal spectrometers, and other instruments were designed and manufactured. All the prerequisites for high-resolution diffraction experiments were created, including the design of special complexes of apparatus or «stations» for studying structures and properties of various materials on the synchrotron-radiation sources and the development of all the necessary methods.

Properties

The relationships between the structures and the physical properties have been established for various ferroelectrics, optically active and liquid crystals, superionics, high-temperature superconductors and also scintillating, magnetic, nonlinear optical, acoustooptical, and other crystalline materials. New crystalline media with specific physical properties were discovered, including numerous lasing crystals, media for liquid-crystal displays, holographic media, etc. The Institute was the first to discover the phenomena of electrogyration and the photovoltaic effect, to develop the Fourier spectroscopy, and to establish the domain structure of ferroelectrics and ferroelectric properties of two-dimensional systems.

Growth

The theory of crystallization was developed including the fundamentals of elementary growth processes. A helical relief of the surface of a growing crystal was established.

The method of artificial epitaxy of thin films was developed as well as the controlled growth of tip crystals and solid-phase intergrowth of single crystals. For the first time, single-crystal germanium and silicon layers were obtained, and a special method was suggested for growth of bicrystals. The first experiments on crystal growth under the microgravity conditions were performed onboard the Salyut-5 orbital stations. The method of horizontal crystallization of refractory materials was developed. Special technologies and apparatus were designed for growth of various specific crystals, including the crystals used as active elements of tunable lasers. The technologies for growing quartz, Rochelle salt, various piezoelectrics, ruby, and optically nonlinear crystals were developed and scaled-up for their industrial production.

五、庫恰托夫研究院 同步輻射中心簡介

The Kurchatov Institute (Russian: Российский научный центр "Курчатовский Институт" — Russian Scientific Centre "Kurchatov Institute") is Russia's leading research and development institution in the field of nuclear energy. In the Soviet Union it was known as I. V. Kurchatov Institute of Atomic Energy (Russian: Институт Атомной Энергии им. И.В. Курчатова), abbreviated KIAE (Russian: КИАЭ). It is named after Igor Kurchatov.

Until 1955 known under a secret name "Laboratory No. 2 of the USSR Academy of Sciences", the Kurchatov Institute was founded in 1943 with the initial purpose to develop nuclear weapons. The majority of Soviet nuclear reactors were designed in the Institute. Since 1955 it was also the host for major scientific experimental work in fields of thermonuclear fusion and plasma physics. In particular, first tokamak systems were developed there, the most successful of them being T-3 and its larger version T-4. T-4 was tested in 1968 in Novosibirsk, conducting the first quasistationary thermonuclear fusion reaction ever. Until 1991, the Ministry of Atomic Energy oversaw the Kurchatov Institute's administration. After the transformation into the State Scientific Center in November 1991, the Institute became subordinated directly to the Russian Government. According to the Institute's Charter, the Institute's president is appointed by the prime minister based on recommendations from Rosatom. In February 2005 Mikhail Kovalchuk was appointed director of the institute.

In February 2007 the Kurchatov Institute won the tender to be the main organization coordinating efforts in nanotechnology in Russia.

The Kurchatov Institute is located at 1 Kurchatov Square, Moscow.

六、喀山理工學院簡介

Zavoisky Physical-Technical Institute (ZPhTI) of the Kazan Scientific Center of the Russian Academy of Sciences is one of the leading world scientific centers in the field of magnetic radiospectroscopy.

The institute was established in August 1945.

The formation and development of scientific investigations in the ZPhTI are closely associated with the discovery of electron paramagnetic resonance by Evgeny Konstantinovich Zavoisky in 1944. E.K. Zavoisky was one of the first research fellows in the institute. Although he worked in the institute for a short time only, he had never lost contact with it throughout his life, influencing the formation of directions of research.

A significant contribution to the establishment of these directions was also made by prominent scientists, who worked at the institute at different times:

In 1989 the Power Engineering Department in the institute headed by V.E. Alemasov, Corresponding member of the USSR Academy of Sciences was established. In June 1991, Mechanics and Mechanical Engineering Institute and Power Engineering Department were detached from the institute.

At present the major directions of research in ZPhTI are:

-Development and usage of magnetic resonance to study condensed media, including superconductors and liquid crystals.

-Development and usage of novel magnetic-resonance, optical and acoustic methods to study fast processes.

-Development of physical and physical-chemical principles of microelectronics, diagnosis of solid-state surface.

-Development of medical instrumentation on the basis of novel physical principles.

The invariably high level of scientific investigations carried out in the institute is reflected in the major results obtained here in recent years.

Thus, the investigations of high-temperature superconductors revealed heterogeneity of the YBaCuO system; the universal relationship between the critical temperature and the density of states was established; the relevant theory was developed, which made it possible to explain a number of anomalies in high-temperature superconductive materials; the method of a movable spin probe to study the critical state of superconductors was realized.

Promising results were obtained studying multilayer superconductor-ferromagnetic heterostructures.

Liquid crystals with a record high magnetic anisotropy, 100 times as high as the anisotropy of the hitherto known liquid crystals, were obtained.

Investigating nonstationary processes in magnetic resonance, optics and acoustics in condensed matter, anomalous properties of time-resolved EPR spectra of the photosynthesis reaction center (quantum beats, “pseudo-echo”, phase anomaly in spin echo) were theoretically predicted; the giant magneto-acoustic effect in an antiferromagnet was experimentally detected and theoretically described; signals of the multichannel photon echo were observed and the regime of multichannel reading of encoded signals was realized for the first time.

Investigations of physical principles of microelectronics gave rise to the development of new techniques for ion-beam synthesis of submicron films of new phases; new ion-pulsed methods to form semiconductive layers with record high concentrations of electroactive dopants and new methods for ion-induced increase of adhesion and modification optical materials are elaborated.

An experimental model of a low-field medical tomograph TMR-0.02-ZPhTI was created and brought into operation with its further mass production in sight.

New directions of research are intensively developed in the institute: EPR in investigations of photosynthetic processes; EPR imaging of conductive objects; spin polarization in radical reactions; femtosecond laser spectroscopy to investigate rapid processes; scanning tunnel, atomic-force and magnetic microscopy for the solid-surface diagnosis; optically detected EPR techniques; experimental investigation of neuron networks; computer methods for strength tests of carrier systems of constructions as well as modeling of the dynamics of the oil replacement by water in the oil pool.

A novel concept for description of the kinetics of gas-liquid media was developed; the dependence of the interaction of antibodies with the neuronal membrane on its potential was discovered. With the scanning tunnel microscope, the submicron structures with periodically alternating conductivity obtained in doped silica by pulsed interferential laser action were first observed; an atomic-force microscopy technique to study the kinetics of physicochemical processes at the liquid- solid interface was developed.

The institute has established connections with RAS research institutes, Kazan, Moscow and Novosibirsk Universities, applied-research institutes and design offices as well as with the research organizations in Germany, Italy, Poland, Switzerland and other countries.

Wide international acknowledgement of achievements of Kazan physicists in the field of magnetic resonance was confirmed by the following. In August of 1994 in Kazan, for the first time in Russia, the 27th International Ampere Congress, devoted to the fiftieth anniversary of the EPR discovery, was held. 325 scientists from the CIS countries and 155 foreign scientists took part in the Congress.

In 1991, on the initiative of Professor K.M. Salikhov, the International Zavoisky Award to recognize truly outstanding applications or developments of electron paramagnetic resonance was established.

The year 2000 marked the tenth anniversary of the international journal "Applied Magnetic Resonance", published by the ZPhTI in cooperation with the publishing house Springer Wien New York. The journal is devoted to the application of magnetic resonance in physics, chemistry, biology, medicine, geochemistry, ecology and other fields of research. 8 issues of the journal, 1200 pages in total, come out annually.

The institute carries out work to form scientific brainpower. Postgraduates are taught in accordance with 7 specialities, there is a specialized council on defense of doctoral dissertations, the ZPhTI is the base institute of the Chemical Physics Chair of the Kazan State University. In 1997, within the framework of the federal target-specific program "Integration" and with active participation of the ZPhTI two educational/research centers were set up. The ZPhTI takes part in the CRDF program within the framework of the Kazan State University Scientific and Educational Center and the RAS Kazan Scientific Center "Materials and Technologies of the XXI century".

The ZPhTI is one of the full-fledged noncommercial Internet centers in Tatarstan. It provides the operation of the cooperative network of government establishments in the republic and, since 1998, participates in the realization of the project for the accelerated access of the Kazan Scientific Center institutes to information resources and supercomputers of the Russian Academy of Sciences.

The institute consists of research departments, scientific accessorial services, the editorial board of the journal and maintenance departments. Up to now the research departments comprise ten laboratories, four of which are incorporated into two sections.

Research Activities

Current research activity of the Institute is focused mainly on the following problems:

- Development and usage of magnetic resonance for studying and nondestructive control of condensed media including superconductors and liquid crystals.
- Development and usage of novel magnetic-resonance,optical and acoustic methods to study fast processes.
- Development of physical and physical-chemical principles of nanoelectronics and spintronics,diagnostics of solid-state surface.
- Design of medical instrumentation on the basis of novel physical principles.

七、A. E. Arbuzov 有機及物理化學所簡介

The A.E. Arbuzov Institute of Organic and Physical Chemistry is the largest multidisciplinary physical-chemical and chemical-biological research center of the Russian Academy of Sciences in the Volga region. The Institute is widely known because of extensive studies in organoelemental chemistry, chemistry of natural and heterocyclic compounds, petroleum chemistry and chemistry of physiologically active substances.

Main research areas:

- Chemistry of phosphorus, its organic and organoelemental compounds as a basis for the development of new substances, materials and technologies.
- Organic supramolecular chemistry, chemistry of fullerenes and nanosized particles.
- Physical chemistry of complex molecular systems.
- Chemistry of macro- and polynuclear carbo-and heterocyclic compounds.
- Scientific basis of the creation of biologically active materials for medicine, food and agriculture.
- Stereochemistry and crystal chemistry of organic, organoelemental and complex compounds. Preparation, analysis and use of non-racemic substances.
- Geochemistry, chemistry and the scientific foundations of oil and bitumen refining.
- Chemistry of biopolymers and low molecular weight natural compounds.
- Polymer materials for integrated optoelectronics.

The A.E. Arbuzov Institute of Organic and Physical Chemistry is outstanding scientific and educational centre. The Institute participates in the execution of the federal targeted scientific and technical programs, programs of Presidium of the Russian Academy of Sciences, and programs of Branch of chemistry and material sciences. The Institute widely cooperates with universities, industry institutes, as well as with foreign research centers. Together with Kazan State University and Kazan State Technological University in the Institute was established Research Center "Perspective materials and technologies" and basic Dept. "Chemistry and Technology of organic materials and fuels".

Research activities

Research focus of the A.E. Arbuzov Institute has changed with time but kept main scientific guidelines from the time of academicians Arbuzov.

Chemistry of phosphorus and its organic and organoelemental compounds as the basis for the development of new substances, materials and technologies is the oldest research field. Many years of research has resulted in laying the scientific foundations for chemistry of trivalent phosphorus derivatives. New rearrangements have been

detected, novel types and classes of phosphorus derivatives with coordination number from two to five produced. The Arbuzov and Pudovik reactions mechanisms have been studied in detail, and new reactions of intra- and intermolecular heterocyclization, leading to new mono-, poly-, and spirophosphacycles, cage constructions and heterocycles with carbohydrates fragments, have been developed. The substantial contribution to the study of dual reactivity of P(III) acids derivatives has been made, and the phenomenon of chemical polarization at phosphorus nuclei has been discovered. The reaction of pentacoordinated phosphorus compounds with arylacetylenes, leading to the formation of cyclic phosphorus analogues of natural systems, has been found and thoroughly investigated. Coordination chemistry and organometallic chemistry are quickly developing fields in the Institute.Unusual poly- and heteropolynuclear compounds, as well as paramagnetic complexes of transition metals with free radical fragments, are synthesized at the Institute. The coordination compounds with unusual geometry of transition metal environment are obtained; compounds with phosphorus-metal labile 'bent' bonds and optically active metal complexes with chiral ligands are synthesized.

Additionally, new effective methods for electrosynthesis of various classes of organophosphorus compound (OPC) with P-C, P-O and P-N bonds directly from white phosphorus are developed. The electrochemical method allows carryng out reactions in soft conditions at high rate and selectivity, and its manufacturing application will allow rejecting the faulty 'chlorine technology' widely used in present.

In the last decade organic supramolecular chemistry and fullerene chemistry are developed in the Institute. Novel organophosphorus, organosulfur and organosilicon derivatives of calyx[4]arene, thiacalyx[4]arene and calyx[4]resorcinarene were synthesized. On their basis pH-controlled extragents were obtained, efficiently and selectively binding the rare-earth elements and radionuclides from various solutions including the industrial ones. The design principles for efficient supramolecular catalytic systems, accelerating the hydrolysis of phosphorus acids esters by several orders of value, were developed.

Organofullerens with strong electron acceptor properties, synthesized at the Institute, form the basis for creating the systems for artificial photosynthesis and molecular switches.

Chemistry of heterocyclic compounds, traditional for the A.E. Arbuzov Institute, has transformed into chemistry of macro- and polynuclear carbo- and heterocyclic molecules. New type of heterocyclic structures – pyrimidinophanes – macrocycles of various sizes, containing nucleotide bases, has been synthesized. Efficient methods for synthesis of highlyfunctionalized condensed heterocycles: indans, tetralins, and

benzocycloheptanes, which are of interest for chemistry of natural compounds and pharmacology, are being developed. Stereochemistry of organic, organoelemental complex compounds has being studied at the Institute since its establishment. Original approaches and new reagents are developed, allowing the determination of the enantiomeric composition and absolute configuration of organic substrates by NMR spectroscopy. To obtain the practically important nonracemic drugs without involving enantiopure chiral reagents and/or auxiliary compounds the spontaneous resolution of racemates at crystallization is used.

Recently new stereoselective reactions have been discovered, for example, intramolecular variant of the Pudovik reaction. It enables producing

-heterosubstituted alkylphosphonates – the precursors of biologically important

-amino- and -oxyalkylophosphonic acids with high yield.

Besides, the A.E. Arbuzov Institute continues traditions of natural compounds research. In recent years the technology for producing the concentrated protein, flavonoids (rutin) and pectines from Amarantus cruentus plant and different sorts of lupin has been created. It resulted in patenting biologically active food supplements, some of them having antianemic action. Biologically active derivatives of diterpenoid isosteviol, forming complexes with metal ions and amino acids, are synthesized. Technological regulation has been developed for extracting low-calorie sweetener – glycoside stevioside from Stevia rebaudiana Bertoni plant leaves.

At the A.E. Arbuzov Institute scientific foundations are laid for creation of biologically active substances for use in medicine, food industry and agriculture. Novel drugs such as ‘Phosarbin’ (1955), antifungal ointment ‘Chloracetophos’ (1971), ‘Dimephosphon’ (1983) used in metabolic therapy with wide application spectrum, anti-burn and immune-stimulating drug ‘Xymedon’ (1993), and antiblastomic ‘Glycyphon’ (1993) for curing the cancroid were developed and introduced in medical practice. Highly efficient growth stimulator ‘Melaphen’ was inventad in 2000. Goal-seeking activity of the Institute scientists resulted in the creation of fundamentally new preparations, more efficient than the well-known hypotensive, antihypertensive and -adrenolytic drugs. New class of high-efficient and selective acetylcholinesterase inhibitors has also been synthesized.

In the framework of the research on polymer materials for the integrated optoelectronics original methods for synthesis of nonlinear-optical chromophores, minomers, and oligomers are developed; hardware and software are designed for studying the electreting process of electro-optical polymer networks.

The A.E. Arbuzov Institute is placed in Kazan – the capital of the oil-producing Republic of Tatarstan.

參、心得

甲、2010 年 NSC-RFBR 台俄基金年會

一、 此次與俄羅斯基礎研究基金會（RFBR）年度會議主要決議事項爲：

（一） 進行本年度計畫與研討會申請案審查會，經比對雙方初審結果與討論，各項申請案雙方均推薦者【即 B+B】，始考慮予以補助，佐以領域或地域平衡、俄方主持人進度報告、鼓勵跨領域合作計畫等考量因子，雙方共同擇定 14 件跨領域合作計畫、17 件一般型合作計畫及 7 場研討會申請案（附件一及附件三）。

（二） 重新簽署雙方合作協議附約（附件二），於附約中議定雙方 2011-2013 年共同補助合作計畫與研討會之各階段作業機制與費用分擔。

（三） 雙方同意合作推動在東亞地區之多國（如台、俄、日、韓）合作等。

（四） 議定下年度優先推動領域之擇定、計畫徵求方式、作業時程及年會舉辦時間與地點。

乙、 俄羅斯科學院“Innovation of RAS-2010” 論壇

此行在最後一站赴喀山參加俄羅斯科學院"Innovation of RAS-2010"論壇，能夠得到來自各地學者代表極大回響，很大的原因在於一他們其實對台灣所知十分有限，對我們的科技發展及國家經濟實力相當陌生，而此次副主委的介紹，不僅增廣了他們的見聞，讓他們主動有意與我們進行各種合作，成功達到科技外交！

丙、 俄羅斯科研機構之合作開拓

俄羅斯科研機構一直有個迷思，就是台灣國土這麼小爲何可以相對的發展出如此驚人的經濟實力與國際競爭力，這也是他們近年積極與我國合作之因，在積極學習歐美與台灣經驗的同時，他們投注相當經費在科研環境建設與先進儀器購買，相較於過去幾年，俄羅斯的實驗室已有很大的改變，到處都很新穎，這值得我們自我警惕，要不斷求新、求變、求好，不畏其他國家的追趕。

肆、建議事項

一、與 RFBR 於 10 月底前雙方各自籌組學者團召開會議，共同擇定下（2011）年度優先推動領域並於 11 月對外公告徵求申請案。

二、接洽 Ioffe 理工學院與 Kulchatov 研究院，將其列入本會「龍門」方案之研習合作單位。

三、邀請俄羅斯國立礦業大學校長 Prof. Vladimir S. Litvinenko 來台訪問。

四、評估與喀山科學院在特殊領域（如：化工、製藥、能源及機械製造等）與我國可能之合作方案。

附錄

附件一、國科會與俄羅斯基礎研究基金會 **2010** 雙邊科技年會會議紀錄

Protocol of the 2010 RFBR—NSC Annual Conference

Date: 1 June 2010
Venue: RFBR, Moscow, Russia

Officials of the Russian Foundation for Basic Research (RFBR) and the National Science Council of Taiwan (NSC) met in the RFBR Headquarters in Moscow on June 1, 2010 for regular talks and consultations with the RFBR Board Chairman academician Vladislav Panchenko at the head of the hosting side, and Deputy Minister Chen Cheng-Hong at the head of the visiting side. The results of the meeting were as follows.

1. The Principle Investigators from Russia presented reports on the on-going Russian-Taiwanese joint research projects for the perusal of the RFBR and the NSC officials, all of them were approved.

2. Evaluation results regarding proposals for new projects have been considered and discussed between two sides leading to the agreed decision to support for funding
   - 17 initiative research projects (Annex 1)
   - 14 interdisciplinary research projects (Annex 2)
   - 7 bilateral symposia (Annex 3)

3. Budget for the year 2010 is estimated (Annex 4) and RFBR will allocate 32,700,000 RUR and NSC will cover 1,698,000 USD and 14,000,000 NTD.

4. Both sides have agreed to announce in November 2010 a new Call for Proposals to replace the two existing separate Calls (i.e. proposals for initiative and for interdisciplinary research projects) and to mostly focus on the interdisciplinary fundamental research, capable of bringing innovative results. The priority topics for the Call shall be decided by experts from both sides by 15 October 2010.

5. Both sides have agreed to continue supporting a limited number of initiative research projects by including "Others" at the end of the list of priority topics in the aforementioned Call, so as to encourage academically excellent projects of all fields. Only those projects, receiving highest review results, will be considered for funding.

6. The timetable for the next year (01.08.2010 – 31.07.2011) was discussed and agreed upon (Annex 5).

7. Both sides will jointly initiate multilateral international projects to develop collaboration among their traditional counterparts in the Far Eastern Region (Eastern Asia).

8. The next 2011 RFBR-NSC Annual Conference will be held in Taiwan in May-June 2011.

Done in duplicate in English language, each being equally authentic.

For the NSC

Chen Cheng-Hong
Deputy Minister

For the RFBR

Vladislav Panchenko
Chairman of the Board

Annex 1 List of Funded Initiative Joint Research Projects 2010

No.	Project Title	TW PI	TW Organizatio	Ru Organization	Ru PI
1	Получение и исследование реконструированных доимплантационных эмбрионов млекопитающих с использованием высокоточной фемтосекундной лазерной микрохирургии 利用 高精度飛秒雷射顯微手術研製哺乳類著床前期重構細胞	邱爾德	國立陽明大學生醫光電工程研究所	ИХФ РАН Institute of Theoretical and Experimental Biophysics of RAS	Аветик Шахбазян Avetik Shakhbazyan
2	Эволюция и молекулярная таксономия аскомицетовых дрожжей Тайвань (Филогенетический анализ биологических макромолекул) 台灣子囊酵母菌之分子演化與分類學研究(生物巨分子之基因演化關係分析)	李清福	國立新竹教育大學應用科學系	ГосНИИгенетика State Institute for Genetics and Selection of Industrial Microorgnims (GNII)	Геннадий Наумов Gennadi Naumov
3	Роль и молекулярные механизмы действия онкобелка протимозина альфа в p53-зависимой транскрипции, защите клеток от апоптоза и метастазировании 前胸腺素致癌蛋白在p53相關轉錄、抗細胞凋亡和腫瘤轉移之角色及作用機制探討	蕭瓊莉	國立成功大學微生物學科（所）	НИИ ФХБ имени А.Н.Белозерского МГУ Belozersky Institute of Physico-Chemical Biology, Moscow State University	Александра Евстафьева Alexandra Evsafieva
4	Анализ контактных характеристик и формоизменения поверхностей в пястно-запястном суставе большого пальца 拇指掌腕關節接觸特徵與接觸面型態的分析	張志涵	國立成功大學醫學工程研究所	ИПМех РАН Institute for Problems in Mechanics, Russian Academy of Sciences	Ирина Горячева Irina Goryacheva
5	Электронно-дырочный транспорт и морфология полимер/углеродных композитных пленок 共軛高分子/單層奈米碳管複材之形態與載子輸送	蘇安仲	國立清華大學化學工程學系（所）	ИФХЭ РАН Institute of Physical Chemistry & Electrochemistry, Russian Academy of Sciences	Анатолий В. Ванников Anatoly V.Vannikov
6	Моделирование процессов ударного взаимодействия элементов скелетно-мышечной системы человека с твердыми телами при помощи вязкоупругих моделей, содержащих дробные производные 利用分段導數黏彈模型分析人體肌骨力學系統之衝擊反應	趙振綱	國立臺灣科技大學機械工程系	ВорГАСУ Voronezh State University of Architecture and Civil Engineering	Марина Шитикова Marina Shitikova
7	УФ-протектные и фотоактивные полимерные композитные материалы на основе нанокристаллического кремния и карбида кремния 奈米晶體矽及碳化矽之具紫外光-保護及感光性之高分子材料	摩德章	國立臺灣科技大學化學工程系	МИТХТ Moscow Lomonosov State Academy of Fine Chemical Technology	Анатолий А. Ищенко Anatoli A.Ischenko
8	Новые полибензимидазол/кремнийоксидные нанокомпозитные протонопроводящие мембраны для топливных элементов 質子交換膜燃料電池用新型聚苯咪唑/二氧化矽奈米複合材料薄膜	許聯崇	國立成功大學材料科學及工程學系（所）	ИНЭОС РАН A. N. Nesmeyanov Institute of Organoelement Compounds, Russian Academy of Scien	Александр Львович Русанов Alexander Lvovich Rusanov

9	Структура речных систем и морфология водосборов в пределах северо-западной части Тихоокеанского сейсмического пояса 西北太平洋地震帶河川網路與集水區型態研究	江申	財團法人國家實驗研究院地震工程研究中心	ООО РЭА-Приморье Pacific Inst. of Geography FEB RAS	Борис Гарцман Boris Gartsman
10	Супрамолекулярные структуры и фазовое поведение сопряженных клубково-стержнеобразных сополимеров в растворе и в тонких пленках: эксперимент и теория 共軛硬-軟嵌段共聚物及其超分子在塊狀與薄膜中之微結構與相行為	童世煌	國立臺灣大學高分子科學與工程學研究所	МГУ M. V. Lomonosov Moscow State University	Алексей Ремович Хохлов Alexei R.Khokhlov
11	Взаимосвязь пристенных вязких течений и нестационарного поля в окрестности изломов обтекаемого контура 不連續曲面近壁剪流及非定常流相互關係之研究	鍾光民	國立成功大學航空太空科技研究中心	ИТПМ СО РАН Khristianovich Institute of Theoretical and Applied Mechanics SB RAS/	Вадим Аксентьевич Лебига Vadim Lebiga
12	Исследование физико-химического механизма индуцированного соосаждения и разработка основ получения поглощающих слоев CIS/CIGS для солнечных элементов 使用引發共電鍍法沉積銅銦硒/銅銦鎵硒吸收層之太陽能電池及其成長機制探討	鄭明哲	長庚大學電子工程學系	ИПХФ РАН IPCP RAS	Геннадий Федорович Новиков Gennady Fiodorovich Novikov
13	Оптимизация цифровых устройств посредством синтеза схем с ограничениями на структуру схемы 以拓蹼限定合成之硬體系統最佳化	江介宏	國立臺灣大學電子工程學研究所	ТГУ Tomsk State University	Нина Евтушенко NinaYevtushenko
14	Гидроакустический и дистанционный поверхностный мониторинг внутренних волн на шельфе о.Тайвань 水下聲波與遙測應用於台灣大陸棚之內波偵測	黃煌煇	國立成功大學水利及海洋工程學系（所）	НЦВИ ИОФРАН A.M.Prokhorov General Physics Institute, Russian Academy of Sciences	Петников В. Г. Valery G.Petnikov
15	Восстановление дифференциальных операторов по неполной спектральной и узловой информации 由不完整的譜集合和節點重建微分算子的研究	謝忠村	淡江大學數學系	СарГУ Department of Mathematics, Saratov University, Russia	Вячеслав Юрко VjacheslavYurko
16	Влияние изменения климата на формирование селевых потоков в береговой зоне 延海地區因氣候衝擊產生之土石流研究	劉格非	國立臺灣大學土木工程學系暨研究所	МГУ Географический ф-т Moscow State University, Faculty of Geography	Сергей Владимирович Чистов Sergey Vladimirivic Chistov
17	Процессы генерации метана в пресноводных условиях и сравнение их с морским метанообразованием 淡水環境甲烷的生成機制及其與海洋環境的比較與異同	林晧武	國立臺灣大學海洋研究所	ИГХ СО РАН Institute of Geochemistry, Siberian Branch of Russian Academy of Sciences	Геннадий Калмычков Gennady Kalmychkov

Annex 2 List of Funded Interdisciplinary Joint Research Projects 2010

No.	Subtopic	Project Title in Mandarin	Project Title in Russian	Project Title in English	TW Organization	TW PI	RU Organization	RU PI
1	2.5	以MRM多重反應監測蛋白體學技術定量分析人類第18號染色體之特定蛋白質	Количественный анализ белков, кодируемых 18 хромосомой человека, посредством направленной протеомики, основанной на мониторинге множественных реакций	Targeted proteomics approach by Multiple Reaction Monitoring for the quantitation of selected proteins encoded in 18 chromosome	長庚大學分子生物學科	余兆松 Jau-Song Yu	ИБМХ РАМН Department of Proteomics and Bioinformatics, Institute of Biomedical Chemistry	Andrei Lisitsa Андрей В. Лисица
2	2.7	人類轉譯終止因子eRF1的結構,動性及區域間之交互作用	Структура, динамика и междоменные взаимодействия фактора терминации трансляции eRF1 человека в растворе	Structure, dynamics and interdomain interactions of the human termination translation factor eRF1 in solution	中央研究院生物醫學科學研究所	黃太煌 Huang Taihuang	ИМБ РАН,МГУ ЦМТС M.V. Lomonosov Moscow State University	Vladimir Ivanovich Polshakov Владимир Иванович Польшаков
3	3.3	磁致伸縮振盪效應對鐵磁-鐵電性薄膜奈米結構之穩定性影響研究	Исследование влияния магнитострикционных колебаний на стабильность наноструктуры в ферромагнитных – ферроэлектрических пленочных структурах	Research of magnetostrictive oscillation effect on the stability of nanostructure in ferromagnetic - ferroelectric film systems	國立成功大學航空太空工程學系（所）	鄭金祥 Chin-Hsiang Cheng	ИФТПМ СО РАН Institute of Strength Physics and Materials Science SB RAS	Victor Evgenyevich Panin Виктор Евгеньевич Панин
4	2.8	新型幾丁質與奈米纖維素為基礎之生物複合材料在生物技術上之應用	Биокомпозиты на основе хитина, хитозана и наноцеллюлозы для применения в биотехнологии	Biocomposites prepared from novel chitin/chitosan and nanocellulose for biotechnology applications	國立臺灣科技大學化學工程系	李振綱 Cheng-Kang Lee	Центр Биоинженерия Centre "Bioengineering of Russian Academy of Sciences	Valery Petrovich Varlamov Валерий Петрович Варламов
5	3.2	具氧化銦/氧化銦結構之奈米溝渠/奈米線生長研究與高速電晶體應用	Гетероструктуры на основе нанопроволок InO/N для сверхскоростной электроники	Nano-trench growth of InO/N nanowire heterostructures for high speed electronics application	國立臺灣大學光電工程學研究所	林浩雄 Hao-Hsiug Lin	МИРЭА Moscow State Institute Tech. U (MIREA)	Alexander Sergeyevich Sigov Александр Сергеевич Сигов
6	3.2	新世代液晶顯示器及光子元件用調諧式高分子膜之製備及特性研究	Синтез и исследование полимерных плёнок с настраиваемыми мезогенными наноэлементами для нового поколения дисплеев и фотонных устройств	Synthesis and characterization of polymeric films with tunable mesogenic nanoelements for next generation of display and photonic devices	國立成功大學化學工程學系（所）	劉瑞祥 Jui-Hsiang Liu	МГУ Физический ф-т Physics Department, M.V. Lomonosov Moscow State University	Alexander Vacheslavovich Emelyanenko Александр Вячеславович Емельяненко
7	3.5	新壓電陶瓷複合物特性在水下聲波多媒體通訊的理論研究與檢測開發	Разработка экспериментально-теоретических методов исследования свойств новых пьезокерамических композитов и устройств с изучением их применений для подводной акустической мультимедийной связи	Development of Test and Theoretical Research Methods of Properties of the New Piezoceramic Composites and Devices with Investigation Their Applications for Underwater Acoustic Multimedia Communication	國立高雄海洋科技大學微電子工程系	張順雄 Shun-Hsyung Chang	ЮФУ НИИМПМ Vorovich Mechanics and Applied Mathematics	Ivan A.Parinov Иван А. Паринов

8	1.1	高功率頻率可調太赫茲電子元件	Мощные частотно-перестраиваемые терагерцовые электронные источники	Powerful frequency-tunable terahertz electron devices	國立清華大學物理學系（所）	張存續 Tsun-Hsu Chang	ИПФ РАН Russian Academic of Science	V. L.Bratman В.Л. Братман
9	2.7	以液相電噴灑輔助雷射脫附游離法結合傅立葉轉換式質譜儀對胜肽及蛋白質進行高解析的直接分析	Создание нового метода анализа белков и пептидов с высоким разрешением по массам с использованием лазерной десорбции-электроспрейной ионизации и масс-спектрометрии ионного циклотронного резонанса с преобразованием Фурь	Development of the new method for high-resolution peptide and protein analysis by liquid electrospray-assisted laser desorption ionization (liquid-ELDI) Fourier transform ion cyclotron resonance (FT-ICR) mass spectrometry	國立中山大學化學系（所）	謝建台 Jentaie Shiea	ИНЭПХФ РАН The Institute for Energy Problems of Chemical Physics Russian Academy of Science	Evgenij Nikolaev Евгений Н.Николаев
10	3.3	磁電及多鐵性薄膜在奈米自旋電子元件之研究	Пленочные структуры на основе магнитоэлектриков и мультиферроиков как эффективные материалы наноэлектроники	Magnetoelectric and multiferroic film structures as efficient materials for nanoelectronics	National Sun Yat-sen University	周雄 Hsiung Chou	ИОФ РАН General Physics Institute of Russian Academy of Sciences	Pyatakov Alexander Pavlovich
11	3.2	原子與固態微奈米結構中極化子的量子資訊處理	Обработка квантовой информации на основе поляритонов в твердотельных и атомных микро- и наноструктурах	Quantum information processing with polaritons in solid state and atomic micro- and nanostructures	國立清華大學光電研究所	李瑞光 Lee Ray-Kuang	ВлГУ Vladimir State University	Alexandr Pavlovich Alodzhants Александр Павлович Алоджанц
12	2.3	利用高通量細胞膜與分泌蛋白體分析來尋找結腸和直腸癌生物指標	Поиск биомаркеров колоректального рака методами высокопроизводительной протеомики клеточных мембран и секре	High-throughput Membrane Proteomics and Secretomics for Colorectal Cancer Biomarker Discovery	國立成功大學環境醫學研究所	廖寶琦 Pao-Chi Liao	ИБМХ РАМН Institute of Biomedical Chemistry of Russian Academy of Medical Sciences	Alexander I. Archakov Александр И. Арчаков
13	3.2	金屬-有機架構化合物的自組裝合成及其在通訊及無線電波的應用	Самосборка металл-органических каркасных структур ля разработки нового поколения телекоммуникационных систем и электроники в микроволновом и миллиметровом диапазоне	Self-Assembly of Metal-Organic Frameworks new nanostructures materials for elaboration of next-generation telecommunication systems and electronic industry in microwave, millimeter wave	中央研究院化學研究所	呂光烈 Kuang-Lieh Lu	Kotel'nikov Institute of Radioengineering and Electronics RAS ФИРЭ им.В.А.Котельникова РАН	Vjacheslav V.Meriakri Вячеслав Вячеславович Мериакри
14	3.4	飛秒雷射激發下電漿子金屬奈米粒子輔助多光子聚合過程之資訊記錄	Запись информации в процессах многофотонной полимеризации с участием металлических плазмонных наночастиц при возбуждении фемтосекунди	Information recording in multiphoton polymerization processes assisted by plasmon metallic nanoparticles under femtosecond laser excitation	國立交通大學應用化學系（所）	林聖賢 Sheng–Hsien Lin	Semenov Institute of Chemical Physics RAS ИХФ РАН	Leonid Trakhtenberg Леонид И. Трахтенберг

Annex 3 List of Joint Symposia 2010

No.	TW PI	Title	TW Organization	RU PI	RU Organization	Date	Venue
1	Chung-Ru Ho 何宗儒	Remote sensing of physical and biological processes: Application for waters around Taiwan 衛星遙測技術應用於台灣週邊水域水文環境研討會	Dept. of Marine Environmental Informatics, National Taiwan Ocean Univ. 國立臺灣海洋大學海洋環境資訊系	Mitnik Leonid Moiseevich	V.I. Il'ichev Pacific Oceanological Inst., Far Eastern Branch of the Russian Academy of Sciences/ Satellite Oceanography Dept.	2010/10/14 - 2010/10/17	Keelung, Taiwan
2	Yen-Chieh Huang 黃衍介	2nd NSC-RFBR Joint Symposium on Nonlinear Optics and Photonics 第二屆台俄非線性光學與光子學研討會	Inst. of Photonics Technologies, National Tsing Hua Univ. 國立清華大學光電工程研究所	Makarov Vladimir Anatol'evich	International Laser Center of M.V.Lomonosov Moscow State Univ.	2011/03/22 - 2011/03/26	Hsinchu, Taiwan
3	Jentaie Shiea 謝建台	New mass spectrometry methods in proteomics 開發蛋白質體學研究之新影質譜方法研討會	Dept. of Chemistry, National Sun Yat-Sen University 國立中山大學化學系	Evgeny Nikolaev	Institute for Energy Problems of Chemical Physics, RAS	2011/03/12 - 2011/03/13	Kaohsiung, Taiwan
4	Jiunn-Yuan Lin 林俊源	Magnetism, superconductivity, and the electronic structure in low-dimensional systems 低維系統磁性、超導與電子結構	Inst. of Physics, National Chiao Tung Univ. 國立交通大學物理研究所	Valiliev Alexander Nikolaevich	Low Temperature Physics and Superconductivity Dept., Moscow State Univ.	2010/08 - 2010/10	Hsinchu and Kaohsiung, Taiwan
5	Kuan-Han Lee 李冠漢	Taiwanese-Russian Organic, Medicinal and Bio Chemistry Interations 2011 2011年台俄有機、藥物及生物化學交流研討會	Chia Nan Univ. of Pharmacy & Science 嘉南藥理科技大學	Zefirov Nikolay Serafimovich	M.V. Lomonosov Moscow State Univ., Faculty of Chemistry	2011/03/14 - 2011/03/16	Tainan, Taiwan
6	Yuen-Wuu Suen 孫允武	Nanophotonics and nanoelectronics: materials and physics II 奈米光電與奈米電子學-材料與物理II	Physics Dept., National Chung Hsing Univ. 國立中興大學物理學系	Zhuravlev Konstantin Sergeevich	Inst. of Semiconductor Physics Siberian Branch of Russian Academy of Sciences	2010/10/18 - 2010/10/21	Taichung, Taiwan
7	Shuo Hung Chang 張所鋐	Taiwan-Russian Bilateral Symposium on Problems in Advanced Mechanics 台俄雙邊研討會-先進力學問題	Dept. of Mechanical Eng., Natinoal Taiwan Univ. 國立臺灣大學機械工程學系	Okunev Yuri Mikhailovich	Inst. of Mechanics of Lomonosov Moscow State Univ.	2010/09/05 - 2010/09/11	Moscow, Russia

Annex 4

k=1,000

■ Budget for 2010

- ☐ Ongoing 45 projects (from year 2008, 2009)
- ☐ New 17 initiative projects (Annex 1)
- ☐ New 14 interdisciplinary projects (Annex 2)
- ☐ New 7 symposia (Annex 3)

■ Budget Share by RFBR

- ☐ Ongoing 45 projects: 13,200 k RUR
- ☐ New 17 initiative projects: 7,800 k RUR
- ☐ New 14 interdisciplinary projects: 11,700k RUR

Sum = 32,700k RUR

■ Budget Share by NSC

- ☐ Ongoing 45 projects: 24k USD x 45 = 1,080k USD
- ☐ New 17 initiative projects: 24k USD x 17 = 408k USD
- ☐ New 14 interdisciplinary projects: 1,000k NTD x 14 = 14,000k NTD
- ☐ New 7 symposia: 30k USD x 7 = 210k USD

Sum = 1,698k USD + 14,000k NTD

Annex 5

- **Setting of Priority Areas** 15 October 2010
- **Call for Proposals** 01 November 2010

- **Application Deadline** 31 January 2011
- **Peer Review Results and Exchange**
  31 Mar 2011
- **Annual Conference** May 2011, in Taipei
- **Grants Announcement** June 2011

- **Executing Period for Projects**
  01 August 2011 ~ 31 July 2012
- **Executing Period for Symposia**
  01 August 2011 ~ 31 July 2012

附件二、國科會與俄羅斯基礎研究基金會第 3 次合作附約

Amendment to the Agreement on Scientific Cooperation between Russian Foundation for Basic Research, Russia and National Science Council, Taiwan

1. General

The Russian Foundation for Basic Research (RFBR) and the National Science Council of Taiwan (NSC), hereinafter referred to as "the Parties", on basis of the previous Amendment to the Agreement, signed on 1 November 2004, and the Protocols of RFBR-NSC, signed on 22 May 2007 and 15 September 2009, have agreed to continue mutual funding of two countries' scientists collaboration in joint research and other forms in fundamental sciences. To this aim the Parties have reached the following understanding.

2. Activities

Mutual funding shall be used primarily to support bilateral joint research projects and symposia (workshops). Other forms of collaboration may be added upon mutual agreement. In particular, participation of young researchers is important to encourage as also multilateral approach (Eastern Asia) to study complex scientific problems.

3. Joint Research Projects

(1) The Parties shall launch annually joint call for research projects' proposals, announcing it simultaneously on their websites.

(2) To initiate a project, scientists from both sides shall form a research team, jointly led by principal investigators (PI's), one from Russia and one from Taiwan. The Russian PI should submit a proposal to RFBR, while the Taiwanese PI to NSC, both using one standard application form in English language, developed by the Parties. Team members must be eligible for the grants funded by the Parties.

(3) The Parties will review the proposals under the following selection criteria:

- Scientific quality, feasibility and innovativeness of the joint research plan
- Added value to be expected from the research collaboration
- Competence and expertise of the team's members
- Appropriateness of resources and funding requested
- Expected impacts: e.g. scientific, technological, economic, societal

- Opportunities for early career researchers

(4) The topics of the projects with one to three year duration period will be selected and formulated in connection with the current national scientific priorities in Russia and Taiwan. Formulation of topics, as well as subtopics, will be entrusted to experts from both sides. The Parties shall facilitate their regular meetings in line with and on the terms of bilateral symposia program supported by the Parties on an annual basis. .

(5) The funding allocation for research projects will be decided by the Parties on the Annual RFBR-NSC Conference and put down in writing in the Protocol. However, it may be reasonably modified afterwards according to either Party's budgetary situation.

(6) Each partner in a project will be responsible for complying with its funding organization's intellectual property rights requirements and partners in a project will work out any necessary IP rights agreements among themselves.

4. Joint Symposia

(1) The Parties shall simultaneously announce Calls for Joint Symposia Proposals annually on their websites.

(2) The purposes of symposia are to provide the two countries' scientists a venue for presenting and exchanging results of their research, as well as to help scientists to find prospective partners for future joint research projects.

(3) To organize a symposium, the conveners from each side, shall submit a joint proposal to RFBR and NSC, respectively, using one standard application form in English language, agreed upon by the Parties.

(4) A convened symposia (in Russia or Taiwan) shall be attended by no less than 20 participants from both sides with at least 5 of them from the visiting side.

(5) The hosting Party shall cover the symposia organization and the visitors' accommodation, while the sending Party shall cover the international travel (including transportation to the city where symposium takes place).

(6) Peer scientists, scientists from other countries, and industry researchers are welcome to participate, but shall bear the expenses by themselves.

5. **Reports and Evaluation**

(1) Joint projects: each PI must submit a mid-term report in one month prior to the end of the annual execution period and final report in two months after the end. Research

findings for completed projects must be presented at the conference held during the regular annual meetings of the RFBR and NSC official delegations.

(2) Symposia: reports on these activities shall be submitted by the national teams' leaders in English to the respective funding Party within two months after completion of the event.

(3) Reports on cooperative projects will be evaluated by experts and serve as the RFBR and NSC's reference in future decision-making and usage of the mutual funding.

6. Modification and Duration

The present Amendment may be modified and extended at any time by mutual agreement of the Parties. It shall be effective for a period of three years from the date of its signature. Thereafter, it shall be reviewed by the Parties for update for the next three years, unless it is terminated by either Party giving another Party a six months prior notice in writing.

Done in Moscow on 1 June 2010 in duplicate in English, each being equally authentic.

For
Russian Foundation for Basic Research
Moscow, Russia

Panchenko Vladislav Yakovlevich
Chairman of the Board

For
National Science Council
Taipei, Taiwan

Chen Cheng-Hong
Deputy Minister

附件三、2010 年度 NSC-RFBR 跨領域主題及年度優先推動領域

A：跨領域主題 【3 大主題，含 16 項子題】

I. Coherent interaction of X-ray, synchrotron and terahertz radiation with condensed matter

II. Genomics and proteomics of eukaryotes: The key aspects

III. Noval properties and application of condensed matter

I. Coherent interaction of X-ray, synchrotron and terahertz radiation with condensed matter

1. Generation, detection and applications (spectroscopy, imaging, modification) of terahertz radiation
2. Applications of synchrotron light source for investigations of surface thin filems and biomaterials
3. Gigahertz and terahertz photonics-based elements and devices
4. Coherent X-ray diffraction and scattering for condensed matter studies

II. Genomics and proteomics of eukaryotes: The key aspects

1. Cancer proteomics--

1.1 Cancer markers

i. Identification of new protein targets for cancer chemotherapy based on search and validation of miRNAs regulating the translation of these targets

ii. Identification of most informative prognostic markers of cancer based on miRNA profiling in patient serum

1.2 High-throughput proteomics of membrane proteins to foster the understanding of cancer mechanisms.

2. Genomics in developmental biology--

i. Investigation of structural organization of the eukaryotes genome

ii. Gene-centric approach for proteome identification with a focus on 18-th chromosome

iii. The whole genome mapping of forum-domains in Drosophila and human genomes

3. New concepts and methods for proteomic investigations
4. Development of novel carbohydrates and glycans for biotech application and other aspects
5. Coherent phase microscopy for pharmacological studies

III. Noval properties and application of condensed matter

1. Magnetic random access memory (MRAM).

2. Nanostructures and nanoelements for telecommunication systems and for next-generation applications of electronic industry

3. Magnetoelectric interactions in micro- and nano-ferromagnetic-ferroelectric film structures

4. Optical and memory active novel thermal stable polymers

5. Materials for acoustics and acoustoelectronics

6. Semiconductor III-V heterostuctures (including diluted nitrides) for nano-electronics and photonics.

7. Complex positron annihilation study of intrinsic and modified nanoporosity in novel polymeric membrane materials for gas separation and sorption

B：年度優先推動領域【6 大領域，14 項重點】

I. Medical Physics and Biomedicine

— structure and function of biological macromolecules, cellular and developmental biology, and systems biology

II. Mechanics

— nonstationary phenomena in high speed flows

III. Optoelectronics

— mathematical synthesis of integrated optical waveguides and devices

IV. Polymer Physics

— computer simulations of bulk polymers, polymer/carbon composite materials, polymer coatings for regulated wetting on solid surfaces, smart polymer systems and magnetic elastomers

V. Supercritical technologies

— surface modification in supercritical carbon dioxide

VI. Earth Science

- Geochemical evolution of magmatism for Siberia and Taiwan ,
- Surface continental water, chemistry of the environment (Baikal region),
- Impact of climate change and anthropogenic factor and natural hazards on processes in coastal zone