

Nanotechnological initiative of the St.Petersburg State University



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SPbSU Nanotech initiative

- ✓ The declared strategic goal of the Russian federal nanotech program is forming of the Russian national nanoindustry sector, positioned au par with the today's leading countries in the field US, EU, Japan and China, and serving the purpose of enhancing the quality of life, national and technological security and maintaining the high speed of economic development
- ✓ **The activity of the St.Petersburg State University in the field of nanotechnology is to participate the national nanotechnological initiative using our competitive advantages.**

SPbSU nanotech initiative

✓ Competitive advantages of the SPbSU

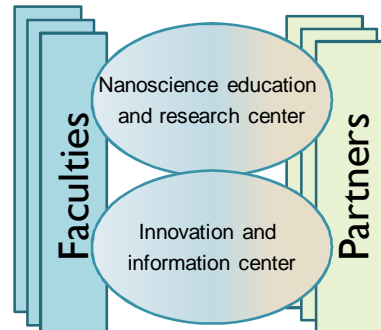
- ❖ The largest classical multidisciplinary university in the NW Russia
- ❖ Research potential and infrastructure
- ❖ Partnership network in Russia
- ❖ Partnership network in Europe
- ❖ Substantial boost of infrastructure through series of grants from National projects and federal targeted programs

✓ Program goals are to develop:

- ❖ Complex research programs
- ❖ New education for new industry
- ❖ Internationally recognized research infrastructure
- ❖ Diversification of funding
- ❖ Innovation and entrepreneurship

✓ Faculties-participants

- | | |
|-------------------------|----------------------------|
| ❖ Physics | ❖ Geology |
| ❖ Chemistry | ❖ Math and mechanics |
| ❖ Biology and Soil sci. | ❖ Applied math and control |
| ❖ Medicine | |



✓ Risks

- ❖ Change in political and economic situation
- ❖ Inertia of the system
- ❖ Low demand from the market

Expected results

✓ 2007-2009

Nanoscience research and education center

✓ 2008-2009

Selection and launching research and educational projects

✓ 2010-2014

Innovation center and commercialization system

Achievements so far

- ✓ **Nanoscience research and education center**
 - ❖ SPbSU nanoscience council for education and research
 - ❖ SPbSU Nanoscience project database (over 80 projects)
 - ❖ The advanced electronic microscopy nanodiagnostic complex to be launched mid-May 2008
 - ❖ 17 educational programs, dealing with nanoscience identified.
 - ❖ Total investment in nanoscience infrastructure in 2006-2007 reached about EURO 10M
- ✓ **Innovation center**
 - ❖ A project of launching the SPbSU Science and Tech park (by 2014)

Nanoequipment -- diagnostics

Already purchased in 2006-2007 (over US\$10M worth, Innovation project):

Raster and scanning electron microscopy complexes (FEI, Carl Zeiss)

Analytical complexes for low molecular compound analyses

Surface preparation and analysis complexes

Nanolab complexes

Spectrometers, diffractometers, sample preparation complexes

US\$5 mln worth electronic microscopy complex (Nanocenter project):

Hi-res transmission analytical electron microscope Libra 200FE (resolution 0.14 nm, cryoholder and 3D-topography for bioobjects)

Multifunctional analytical raster complex Supra 40 (resolution 1nm, microanalysis, helium temperatures, cathodoluminescent spec)

Helium microscope (resolution 0.5 nm, enhanced atomic number contrast, super high depth 3D topography, nondestructive measurements)

! THIRD WORLDWIDE

Nanoprojects (statistics)

- ✓ Over 80 projects, ca 60 groups and ca 300 staff
- ✓ Themes include:
 - ❖ Nanomaterials (25)
 - ❖ Nanodiagnostics (11)
 - ❖ Nanotechnologies (29)
 - ❖ Nanosystems (12)
 - ❖ Other (3)

Nanoprojects – Bio and Chemo

- ✓ Biocompatible nanocomposites for replacing tissues and organs (1)
- ✓ Biomedical nanotechnologies for superlocal nanoselective diagnostics, therapy, surgery and genetic engineering (9)
- ✓ High resolution methods for controlling structure, chemical composition and geometry of the nanoobjects and nanomaterials (4)
- ✓ Physico-chemical nanotechnologies based on atomic and molecular chemical assembly and self-assembly of inorganic and organic compounds (17)
- ✓ Nanochemical components (sorbents, catalysts, pumps, reactors) for high-efficiency purification, selective high-speed and productivity synthesis and atomic and molecular engineering (3)
- ✓ Micro- and nanoinstrumentation for the atomic and molecular engineering processes (1)

Nanoprojects – Photonics

- ✓ Nanoelectronic components for superintegrated super high performance systems of generation, transmission, storage and processing of information (4)
- ✓ Nanooptical components (element base – emitters, photoreceivers, transformers) for the energetically efficient phototechnology, the systems of the ultrafast enhanced noise protected transmission and processing of information (2)
- ✓ Nanostructures and nanocompositions for the electronic and photonic information systems (6)

Nanoprojects – Composites

- ✓ Smart nanocomposite materials with adaptability, associativity and memory (3)
- ✓ Nanocomposite and nanodispersive materials for high efficiency separation and selective catalysis (5)
- ✓ Nanocomposite materials with enhanced resistance to extreme factors for thermo-, chemo- and radiation-resistant set-ups (3)
- ✓ Nanocomposite materials with the specific mechanical properties for the superstrong, superelastic and superlight engineering designs (2)
- ✓ Nanocomposition materials for generation, transformation and storage of energy (4)

Nanoeducation -- programs

- ✓ «Molecular geochemistry and biogeochemistry»
- ✓ «Nanobiology»
- ✓ «Applied math and physics»
- ✓ «Mechanics and applied math»
- ✓ «Colloid and active surfactant chemistry»
- ✓ «Thermodynamics of surface phenomena»
- ✓ «Chemistry of ultradisperse solid state (nanochemistry)»
- ✓ «Advances in nanochemistry»
- ✓ «Chemical thermodynamics of materials»
- ✓ «Thermodynamics and kinetics of phase transitions and chemical»
- ✓ «Electrochemistry of complex systems»
- ✓ «Ionics and reactivity of solids»
- ✓ «Modern techniques in diagnostics of materials»
- ✓ «Enzymology»
- ✓ «Molecular biology of genes»
- ✓ «Genetic control of matrix processes»
- ✓ «Biophysics of complex systems»

Nanoresearch partnerships

Companies

- ✓ Carl Zeiss
- ✓ ЗАО «НТЦ Прикладных нанотехнологий», Санкт-Петербург
- ✓ Sun Microsystems
- ✓ Научно-исследовательский центр «Алгоритм»
- ✓ Microtek, Germany

Nanoresearch partnerships

Foreign universities and research institutions

- ✓ US: Argonne National Lab, Illinois
- ✓ UK: University College London, Nanomedical center, Imperial college
- ✓ Germany: Max Planck Institute for Chemistry, Universities of Hannover and Erlanger-Nuremberg
- ✓ Taiwan: National University of Science and Technology
- ✓ France: University Paris-Sud, Sorbonne
- ✓ Brasil: Universidade Federal do Rio de Janeiro
- ✓ Denmark: The University of Copenhagen
- ✓ Finland: University of Mikkeli
- ✓ Sweden: Malmo University
- ✓ Netherlands: Zernike Institute for Advanced Materials Groningen University
- ✓ Estonia: Tallinn Polytechnical university

Nanoresearch partnerships

Foreign partnerships structure:

- | | |
|----------------------|--------------|
| ✓ Australia (2) | ✓ India (1) |
| ✓ Brasil (1) | ✓ Italy (3) |
| ✓ China (1) | ✓ Poland (3) |
| ✓ Czech Republic (1) | ✓ Spain (2) |
| ✓ Denmark (2) | ✓ Sweden (3) |
| ✓ Estonia (1) | ✓ Taiwan (2) |
| ✓ Finland (2) | ✓ Japan (1) |
| ✓ France (2) | ✓ Turkey(2) |
| ✓ Germany (14) | ✓ UK(2) |
| ✓ Greece (8) | ✓ US (2) |

Nanoresearch partnerships

Russian research institutions

- ✓ Институт высокомолекулярных соединений РАН (СПб)
- ✓ Институт химии силикатов им. И.В. Гребенщикова РАН (СПб),
- ✓ Институт цитологии РАН
- ✓ Институт проблем химической физики, Черноголовка
- ✓ Институт химической физики РАН
- ✓ Институт кристаллографии РАН
- ✓ НПО «Буревестник» (СПб), Институт аналитического приборостроения РАН (СПб)
- ✓ Физико-технический институт им. А.Ф.Иоффе
- ✓ Российско-Корейский Центр научного сотрудничества при СПбГПУ,
- ✓ Санкт-Петербург
- ✓ НИИ детской травматологии и ортопедии им Г.И. Турнера
- ✓ СПб филиал Межведомственного суперкомпьютерного центра РАН и лаб. Нейрогенетики НИИ Физиологии им.И.П.Павлова РАН
- ✓ Институт Цитологии РАН
- ✓ Кардиологический центр
- ✓ Научно-производственное объединение «Прометей»

We invite partners to:

- ✓ Joint research projects (FP7 and other)
- ✓ Joint use of infrastructure
- ✓ Joint contract work
- ✓ Joint educational programs
- ✓

THANK YOU FOR YOUR ATTENTION



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