

**PLAN OF THE RESEARCH PROJECTS FOR 2010  
INSTITUTE OF SOLID STATE PHYSICS - BAS**

Number	Title of the project	Project leader Total number of participants, number of participants from ISSP	Funding provided by /institution, reg. № or code of the project/contract, etc.	Expected funds for 2009
1	2	3	4	5

**I. Projects, funded only by the budget subsidy of BAS**

1	2	3	4	5
1	Phases and phase transitions in systems with competing interactions (superconductivity, superfluidity, magnetism)	Prof. D.I. Uzunov, 2 ISSP-2	BAS	
2	“Structural investigations (X-ray, neutron and electron diffraction) of polycrystalline and monocrystal substances”	Assos.Prof. Malina Baeva, Ph.D. 4 participants	BAS	
3	Electronic properties of solid state systems	Assoc. Prof. PhD K. Christova; 6.	BAS	
4	BIOMATERIALS AND SURFACES: MODIFICATION OF SOLID SURFACES BY NANODIAMOND AS MODEL FOR THE GROWTH OF IMPLANT COATINGS	Assoc. Prof. Dr. L. Pramatarova 3 participants, 3 participants	budget subsidy of BAS	-
5	Crystal growth and investigation with optical, X-ray and electron microscopy methods, doping of carbon nanostructures	Prof. DSc. M. Gospodinov 11 participants	budget subsidy	
6	Semiconductor nanoparticles in	Assoc. Prof. Dr. D.		

	amorphous thin film matrix: formation, structure and properties	Nesheva, 12 participants from ISSP		
7	Structure and properties of semiconductor heterostructures with nano-sized and nano-structured dielectric and semiconductor films	Assoc. Prof. Dr P. Danesh 8 participants from ISSP		
8	Physics and technology of thin films suitable for contemporary microelectronics	Assoc. Prof. Dr. S. Andreev 19 participants	budget subsidy	-
9	Applications of Surface Transverse Waves (STW), Rayleigh Surface Acoustic Waves (RSAW) and Bulk Acoustic Waves (BAW) in Low Noise Microwave Oscillators, Communications and Sensor Systems using Thin Polymers Layers Obtained by Plasma	Assoc. Prof. PhD Ivan Avramov Total number of participants : 6 Number of participants from ISSP : 2	Project funded by : Budget	
10	New multifunctional magnetic materials	Prof. DSc. N. Tonchev 11 participants	budget subsidy of BAS	no
11	Cryogenics, superconductivity and superconducting materials	Prof. DSc. V. Kovachev 11 participants + 1 PhD student	budget subsidy of BAS	no
12	Environmental physics	Assoc.Prof.V.Lovchinov 5 participants from ISSP	Budget subsidy	
13	Optic and spectroscopy of the anisotropic and nonlinear media	Prof. M. Petrov, D.Sc. 11	budget subsidy	
14	Physical optics. Photonics	Prof. S.Rashev, D.Sc. 13	budget subsidy	
15	Nanostructured and bioactive liquid crystals	Assoc. Prof. Dr. Stanimira Naydenova (6 participants)	Budget subsidy	
16	Mechanical and flexoelectric properties	Assoc. Prof. Dr. M. D.		

	and phenomena in thermotropic and lyotropic liquid crystal systems	Mitov (7 participants)		
17	Physics of atoms, molecules and plasma	Prof. DSc. K. Blagoev 8, 1 PhD student		
18	Metal vapour lasers: processes in the gas discharge plasma and interaction between laser emission and materials	Acad. N.V. Sabotinov, DSc. participants from ISSP: 7 1 PhD student	Budget subsidy of BAS	
19	Observation of the nano-sized structure of two-dimensional surface crystalline formations and the nano-sized structure of immobilized on the surface biomacromolecules using purposely-modified scanning probe microscopes	Gencho Minchev Minchev, Assoc. Prof., Ph.D. total number of participants-5 number of participants from ISSP-3	-	-

## II. Projects, additionally funded by contracts with the National Science Fund /NSF/

1	2	3	4	5
1	Defects and nanoclusters in classical and quantum crystals	Prof. D. Pushkarov, DSc, 6, ISSP – 5	NSF, F-1517	
2	Quantum effects in spin systems with strong competing interactions	Prof. N.B. Ivanov, DSc, 10, ISSP - 3	DO02-264	70 000 BGN
3	Coexistence of spin triplet superconductivity and ferromagnetism in some intermetallic compounds	Prof. D.I. Uzunov, DSc, 2, ISSP-2	Φ1507 NSF	
4	GROWTH, CHARACTERIZATION AND STUDY OF THE PHYSICAL PROPERTIES OF NOVEL SINGLE CRYSTALS FROM THE SYSTEMS BI-CO(NI)-MN(RU)-O AND LA-CO(NI)-MN(RU)-O WITH MAGNETOELECTRIC/MULTIFERROIC BEHAVIOR	Prof. Dr. Sci. M.M. Gospodinov	№ TK-H-1712/ 2007	

5	NANOSTRUCTURED COATINGS – NEW BIOMATERIALS FOR BONE IMPLANTS OBTAINED BY A METHOD OF LASER-LIQUID-SOLID INTERACTION (NANOBIOCOMPOSITES)	Assoc. Prof. Dr. L. Pramatarova 19 participants 10 participants	National Science Fund № TK-X 1708/2007	15 000 BGN
6	Multilayer structures and nanocomposite materials for applications in electronics. Modul 1: Multilayer structures containing silicon nanoparticles, suitable for fabrication of electronic memories and single electron devices	Assoc. Prof. Dr. D. Nesheva, 7 participants from ISSP	NSF, NNP-4-1	
7	Three –dimensional assemblies of semiconductor quantum dots : structure, optical, electrical and photoelectrical properties	Assoc. Prof. Dr. D. Nesheva, 4 participants from ISSP	NSF, No BM-1	2 100 BGN-
8	New Ge based amorphous and glassy materials for sensor applications	Head Prof.DSc Venceslav Vassilev, HTMU, 18. ISSP leader Assoc.Prof. Dr. Diana Nesheva, 4	NSF contract DOO 0123/2008, Programme for stimulation of the scientific research in the public Universities	12 960 BGN
9	Alternative dielectrics based on (Hf:Ta <sub>2</sub> O <sub>5</sub> ; Al:Ta <sub>2</sub> O <sub>5</sub> ; Ti:Ta <sub>2</sub> O <sub>5</sub> ) for 65-70 nm for 65-70 nm generation dynamic memories	Prof. E. Atanassova 5 participants + 1 from IGIC	NSF, F1508	
10	Synthesis and investigation of nanolayers of AlN, BN	Assoc.Prof. Dr.S. Georgiev 7 participants, 5 – ISSP	NSF, X- 1505	
11	Investigation on the electronic states in amorphous silicon and related materials.	Res. Assoc. E. Manolov 6 participants from BAS 1 from TU Bratislava	NSF, F-1504	
12	Явления на захват и тяхното влияние върху дълговремева надеждност на наноразмерни структури метален	Assoc.Prof. Dr. A. Paskaleva 16 participants, 3 - ISSP	NSF, TK 02-87	157 500 BGN

	електрод/high-k диелектрик			
13	Investigation of the sorption properties of metal-oxide layers by quartz crystal microbalance	Assoc. prof., PhD Velichka Georgieva (Lazarova) 11, ISSP:11	Project funded by : NSF Project № NT3- 03/06	
14	Design and creation of sensor elements used in the quartz microbalance	Eng. Zdravka Raicheva 10, ISSP: 10	Project funded by : NSF Project № NT3- 04/06	
15	Improving of life quality by sustainable management of surface waters – application for the catchments of the rivers Struma and Mesta	Assoc.Prof.V.Lovchinov number of participants from the unit – 4	NSF DO-02-352 (2009)	140 000 BGN
16	Investigations on the flexoelectrical properties of liquid crystals, Bulgarian-Indian project– iR3	Acad. Alexander G. Petrov (4 participants)	NSF-BIn-5/07	10 000 leva
17	Shapes and thermal fluctuations of lipid vesicles – relation to the properties of their membranes	Prof. DSc Isak M. Bivas (5 participants)	NSF, NTS01-121	23 000 leva
18	Coding, decoding and measurement of quantum information with ultra-cooled atoms and molecules	Assoc. Prof. DSc N. Vitanov ; 3	NSF, VU-I-301/2007	150 000 BGN
19	Theoretical and experimental investigation of quantum information translation and ultra-cooled atoms and molecules interaction	Assist. Prof. Dr. E. Dimova; 3	DO02-1/2008	20 000 lv
20	Laser diagnostics in archaeology	Assoc. Prof. PhD M. G. Grozeva; 30, ISSP-12	NSF TK01/0404	290 000 BGN
21	New multi-component telluride glassy matrices possessing variable non-linear optical properties	Assoc. Prof. PhD Todor Petrov Total - 10 ISSP – 3	NSF, New materials and nanotechnologies TK01/0191	180 000 BGN
22	High-End-Performance Solid-State-Power-Supply Copper Lasers for Fine Material Processing	Assoc. Prof. PhD D.N. Astadjov Number of participants - 5	Laser System Engineering Division of the Center of Advanced Technology (CAT), Indore, India	

### III. Projects, additionally financed by contracts with ministries, organizations and private companies from the country

1	2	3	4	5
1	Microstructural investigation of complexly-doped Fe-Ni-Mn-Mo-V-C(N) steels by X-ray and neutron diffractions	Assos.Prof. Malina Baeva, Ph.D. Total-6 participants IFTT-3 participants	Nuclear Regulatory Agency, Bulgaria	1 500 USD
2	NANOSTRUCTURED COATINGS – NEW BIOMATERIALS FOR BONE IMPLANTS OBTAINED BY A METHOD OF LASER-LIQUID-SOLID INTERACTION (NANOBIOCOMPOSITES)	Assoc. Prof. Dr. L. Pramatarova 8 participants 8 participants	National Innovation Fund at the Ministry of Economy and Energy, 02-54/2007	27 000 BGN
3	Modification of ion implantation created defects in Si-SiO <sub>2</sub> structures with high energy lactones.	Prof. DSc S. Kaschieva 1 participant from ISSP	Russia, Dubna International Institute of Nuclear Research	
4	Obtaining of silver coated superconducting tapes of Y-Ca-Ba-Cu-O system	Prof. Dsc V. Kovachev	Междунститутски договор ИМЗ БАН-ИФТТ БАН	-
5	Nanoscope for enterprises and schools	Gencho Minchev Minchev, Assoc. Prof., Ph.D. participants from ISSP-7	Ministry of Economy and Energy, National Innovation Fund № 5IF-02-51/20.12.2008	25000 BGN

### IV. Projects, additionally financed according to contracts and programs of EU, NATO, UNESCO and other international organizations

1	2	3	4	5
1	NANOBIOCOMPOSITES	Assoc. Prof. Dr. L. Pramatarova 13, 3 persons from ISSP	E!3033 Bionanocomposite, EUREKA EC project	No financing

2	ANNA TRANSNATIONAL ACCESS SCHEME	Assoc. Prof. Dr. L. Pramatarova, 3 persons	Project No 026134(RI I3) ANNA	From ANNA project 2 400 BGN
3	OPTICAL IMAGING TECHNIQUES FOR ANALYSING THICK HYDROXYAPATITE/NANODIAMOND COMPOSITE LAYERS FOR THE STUDY OF BIOMINERALISATION	Assoc. Prof. Dr. L. Pramatarova 6 participants (ISSP) 3 participants (France)	PICS project No 4848 with CNRS, France	4,000 lv.
4	Development of leaky surface acoustic wave (LSAW) based liquid phase sensors	Assoc. Prof., PhD Ivan Avramov 6, ISSP: 6	Project funded by : Research Center Karlsruhe, Germany	5000 €
5	Overdoping of 1-2-3 HTS materials and its influence on the ac losses, critical current, flux pinning, activation energy	Prof. DSc. V. Kovachev 4 participants + 1 PhD student	Euratom	8 000 EUR (20%)
6	Laser-induced breakdown spectroscopy (LIBS) analysis of finds from Trebeniste necropolis	Prof. DSc. Kiril Blagoev, 2	EU- ULF-FORTH 001441/2008	3 000 BGN
7	Radiative constants of Hf III excited states	Prof. DSc. Kiril Blagoev, 2	EC-lcc001431, LASERLAB EUROPE	3 000 BGN

## V. Projects funded under the Academy's bilateral agreements and in the framework of institute-to-institute cooperation

1	2	3	4	5
1	Growth and characterization of oxide crystals for optical applications	Prof. M. Gospodinov 2 participants	Research Institute of Solid State Physics and optics, Budapest	
2	GROWTH AND CHARACTERIZATION OF HYDROXYAPATITE COMPOSITES AS SCAFFOLDS FOR HARD TISSUE REGENERATION	Assist. Prof. Dr. E. Pecheva 4 Bulgarian participants 5 Hungarian participants	Bilateral project with Hungarian Academy of Sciences	
3	INVESTIGATION OF	Assist. Prof. Dr. E.	Bilateral project with Latvian	-

	HYDROXYAPATITE-NANODIAMOND COMPOSITE COATING	Pecheva 6 Bulgarian participants 2 Latvian participants	Academy of Sciences	
4	MICRO AND NANOPATTERNED SURFACES AND DETONATIONAL NANODIAMOND PARTICLES EMBEDDED IN HYDROXYAPATITE COATINGS AS A NEW GENERATION BIOMATERIALS	Assoc. Prof. Dr. L. Pramatarova 6 Bulgarian participants 10 Romanian participants	Bilateral project with Romania Academy of Sciences	
5	Investigation of Ge-based chalcogenide glasses for optoelectronic applications”	Assoc. Prof. Dr. Z.G. Ivanova, 5 participants	Czech Republic <sup>4</sup>	5
6	Optical and photoelectrical characterization of thin films and nanostructured layers based on ZnSe	Assoc. Prof. Dr. D. Nesheva, 4 participants from ISSP	Serbia	
7	Investigation of disordered materials based on Se-Te chalcogenide glasses by means of neutron diffraction and IR spectrophotometry	Assoc. Prof. Dr. V. Pamukchieva Total participants - 6, From ISSP - 3 participants	Hungary	
8	Investigation of the optical and electrical properties of nanostructural chalcogenide semiconductors suitable for memory elements	Assoc. Prof. Dr. D. Arsova, 4 participants, Ioffe Physico Technical Institute, St. Peterburg	Russia	
9	Gas sensitivity and photoinduced changes of of multicomponent chalcogenide films	Assoc. Prof. Dr. D. Arsova, 4 participants, Institute of Applied Physics, Kishinev	Moldova	
10	Multifunctional structures based on silicon dioxide prepared by evaporation and wet chemical methods for opto- and electronic-applications	Assoc. Prof. Dr. A.M. Szekeres, 5 participants, Institute of Physical Chemistry	Romania	
11	Structure and properties of new	Assoc. Prof. Dr. A.M.	Hungary	



	materials and thin films for nano-technologies in optoelectronics	Szekeres, 5 participants, Eotvos L. University		
12	Ellipsometric characterisation of nanostructured porous SiO <sub>x</sub> thin films (2010-2012)	Assoc. Prof. Dr. A.M. Szekeres, 5 participants, Research Institute for Technical Physics and Materials Sciences	Hungary	
13	Silicon oxide films with embedded silicon nano-inclusions for advanced opto- and nanoelectronics applications (2010-2013)	Assoc. Prof. Dr. A.M. Szekeres, 5 participants, Institute of Semiconductor Physics	Ukraine	
14	Characterization of diluted magnetic semiconductor nanostructured thin films (2010-2012)	Assoc. Prof. Dr. A.M. Szekeres, 4 participants, Institute of Atomic Physics	Romania	
15	Constant voltage stress degradation of TaHfO-mixed oxides	Prof. E. Atanassova 9, ISSP - 4	Serbia, Nish (2009-2011)	
16	Piezoelectric crystal microsensors at cryogenic temperatures	Dr. Tsvetan Jordanov 11, ISSP: 6	Project funded by : JINR № 02-0-1065-2007/2009	10 725 \$
17	Synthesis and structural investigations of multifunctional materials	Asist. Prof. Dr Angelina Soyanova – Ivanova 3 members	BAS - Estonian AS 2009-2011	
18	Preparation and study of thin film structures based on magnetic oxides	Assoc. Prof. Dr. Emil Vlachov, 3 members	BAS –Polish AS 2009-2011	
19	Thermal and magnetic properties of HT superconducting and related magnetic materials	Assoc. Prof. V. Lovchinov number of participants from ISSP – 4	Bilateral agreement between BAS and CGRI, Belgium	
20	Mechanical and electrostatical properties of lipid membranes	Assoc. Prof. Dr Marin D. Mitov (6 participants)	BAS – Russian Academy of Sciences	
21	Biophysical properties (structure,	Assist. Prof. Dr Victoria V.	BAS – Austrian Academy of	

	elasticity, interactions) of human erythrocyte ghosts and drug influence on them; Giant vesicles as a simple model of ghosts	Vitkova (2 participants)	Sciences	
22	Mechanical properties of lipid membranes studied by analysis of the tri-dimensional thermal fluctuations of the shape of quasispherical lipid vesicles, observed and recorded by digital holographic microscopy	Assist. Prof. Dr Victoria V. Vitkova (2 participants)	BAS – Université Libre de Bruxelles (Belgique)	
23	Space – time resolved structure of the low pressure hollow cathode discharge	Assist. Prof. Dr. V. Mihailov	Institute of Physics, Belgrade, Serbia	
24	New applications of hollow cathode discharge in depth profile analysis of recent developed nano-structures and optogalvanic spectroscopy	Prof. DSc R. Djulgerova	Institute of Physics, Krakow, Poland	
25	Plasma technologies and their applications	Prof.Dr.N.V.Sabotinov, Total – 4, ISSP - 2	Cooperation between the Polish Academy of Sciences and BAS	