

**PLAN OF THE RESEARCH PROJECTS FOR 2011  
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 2011
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	Growth and investigation of crystals and thin films with EDX, x-rays and optical methods; doping and investigation of carbon nanostructures	Prof. Dr.Sci. Marin Gospodinov participants-8 participants from ISSP - 8		
3	Electronic properties of solid state systems	Assoc.Prof. PhD K. Christova participants-10 participants from ISSP - 6		
4	Modification of solid surfaces by the means of nanodiamants as a model for implants coatings' growth.	Assoc. Prof. PhD Lilyana Pramatarova participants-4 participants from ISSP - 4		
5	Physics of semiconductor glasses and films: nanostructuring, photoinduced	Assoc. Prof. DSc D. Nesheva, 10 participants	Budget	

	phenomena, luminescence.			
6	Structure and properties of semiconductor heterostructures with nanosized and nanostructured dielectric and semiconductor layers.	Assoc. Prof. Dr. A. Szekeres, 7 participants	Budget	
7	Physics and technology of thin films for application in micro- and nanoelectronics	Assoc. Prof. PhD. Albena Paskaleva, 11 participasnts		
8	Mass-, gas- and thermo-sensitivity of sensor systems based on different acoustic waves (Bulk (BAW), Lamb (LAW), Rayleigh (RSAW) and Transverse Surface Acoustic Waves (TSAW))	Assoc. Prof. PhD Velichka Georgieva Total number of participants : 13 Number of participants from ISSP : 13	Project funded by : Budget	
9	New materials, structures and multifunctional magnetic systems	Prof. DSc. N. Tonchev 14 participants	budget subsidy of BAS	no
10	Photonics, optic and spectroscopy of anisotropic and nonlinear media	Prof. S.Rashev, D.Sc. 18	budget subsidy	
11	Nanostructured and bioactive liquid crystals	Assist. Prof. Dr. Yordan G. Marinov (5 participants)	-	-
12	Mechanical and flexoelectric properties and phenomena in thermotropic and lyotropic liquid crystalline systems	Assoc. Prof. Dr. Marin D. Mitov (5 participants)	-	-
13	Physics of atoms, molecules and plasma	Prof. DSc. K. Blagoev 7, 1 PhD student		
14	Metal vapour lasers: processes in the gas discharge plasma and interaction between laser emission and materials	Acad. N.V. Sabotinov, DSc. participants from ISSP: 13, 3 PhD students	Budget subsidy of BAS	
15	Observation of the nano-sized structure of two-dimensional surface crystalline formations and the nano-sized structure	Gencho Minchev Minchev, Assoc. Prof., Ph.D. total number of	-	-

	of immobilized on the surface biomacromolecules using purposely-modified scanning probe microscopes	participants-5 number of participants from ISSP-3		
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## II. Projects, additionally funded by contracts with the National Science Fund /NSF/

1	2	3	4	5
1	Quantum effects in spin systems with strong competing interactions	Prof. N.B. Ivanov, DSc, 10, ISSP - 3	DO02-264	0
2	Growth, characteristics and investigation of th the physical propertes of new crystals in the systems Bi-Co(Ni)-Mn(Ru)-O and La-Co(Ni)-Mn(Ru)-O with magnetoelectric/ multiferroic behavior	Prof. Dr.Sci. Marin Gospodinov total number of participants-15 participants from ISSP - 9	TK-X-1712/2007	0
3	Nanobiocomposites: Novel materials for bone implants	Assoc. Prof. PhD L. Pramatarova participants-20 participants from ISSP - 9	TK - X -1706/2007	15 000 lv.
4	Nanostructured coatings – new biomaterials for bone implants, obtained by laser-liquid-solid interaction process	Assoc. Prof. PhD L. Pramatarova participants-10 participants from ISSP - 8	НИФ-02-54/2007	14 000 lv.
5	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-
6	New amorphous and glassy materials based on Ge suitable for sensor applications.	Assoc. Prof. Dr. D. Nesheva, 4 participants from ISSP	NSF Д002-123/2008	7 000 BGN .
7	Trapping phenomena and their implication	Assoc. Prof. PhD Albena	NSF	157 500 lv.

	on long-term reliability of nano-scale meta gate/high-k dielectric-based devices	Paskaleva, 23 participasnts 4 from ISSP	DTK02-50	
8	Life quality improvement by sustainable control of surface waters- application for water stock area of Struma-river and Mesta- river	Prof. V. Simeonov, Sofia University, ISSP members: 3	ДО-02-352	60 000 BGN
9	Investigations of the flexoelectric properties of liquid crystals, Bulgaria – India – iR3	Acad. Alexander G. Petrov (4 participants)	National Science Fund (Bulgaria), iR3-5/07	10 000 lv
10	Shape and analysis of shape fluctuations of lipid vesicles – tool for studying the properties of their membranes	Prof. Isak Bivas, D.Sc. (5 participants)	National Science Fund (Bulgaria), HTC01-121	-
11	Coding, decoding and measurement of quantum information with ultra-cooled atoms and molecules	Assoc. Prof. DSc N. Vitanov ; 3	NSF, VU-I-301/2007	
12	Theoretical and experimental investigation of quantum information translation and ultra-cooled atoms and molecules interaction	Assist. Prof. Dr. E. Dimova; 3	DO02-1/2008	
13	Novel multi component glasslike tellurium matrices having variable nonlinear optical properties. (2008-2011.)	Assoc.Prof.PhD T.S.Petrov; Number of participants -from ISSP: 5; From Sofia University: 1; From ILS-UEC Tokyo: 1	ДО02-305/19.12.2008	
14	Laser methods for diagnostics in archeology (2009-2011)	Assoc.Prof.PhD M.G. Grozeva Number of participants -30; from ISSP: 12	ДО 02-274/2008	
15	Standardization of laser techniques for investigation and restoration of cultural heritage	Assoc.Prof. PhD M.G. Grozeva Number of participants -9;	Bulgarian-Romanian bilateral agreement: funded by NSF HTC 02-21/2010	

		from ISSP: 6		
16	High-End-Performance Solid-State-Power-Supply Copper Lasers for Fine Material Processing. (2009.-2012.)	Assoc.Prof.PhD. D.N.Astadjov Number of participants - from ISSP, Lab.MVLs: 5;	LabMVLs, ISSP, BAS; 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	Investigation of the structure and phase of zeolite minerals from the region 'Beli Plast' in East Rhodopes mountain, Bulgaria	Assoc. Prof. PhD Malina Baeva total number of participants-3 participants from ISSP - 2	Agency for Nuclear Regulations of Bulgaria	1 000 \$
2	Modification of ion implantation created defects in Si-SiO <sub>2</sub> structures with high energy electrons.	Prof. DSc S. Kaschieva 1 participant from ISSP	Russia, Dubna International Institute of Nuclear Research	2500 USD

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

1	2	3	4	5
1	Light-Induced Strain and Localised Electronic States in Silicon Thin Films	Assoc. Prof. PhD K. Christova participants-5 participants from ISSP - 1	Erasmus program	
2	Hydroxyapatite nanocomposite ceramics– new implant material for bone substitutes	Assoc. Prof. PhD L. Pramatarova participants-30	E!3033, EUREKA	0 lv.

		participants from ISSP - 3		
3	Composite coatings based on polymer-nanodiamond and hydroxyapatite-nanodiamond	Assoc. Prof. PhD L. Pramatarova participants-25 participants from ISSP - 2	n. 026134, ANNA	4 000 lv.
4	Optical imaging techniques for analysing thick hydroxyapatite/ nanodiamond composite layers for the study of biomineralization	Assoc. Prof. PhD L. Pramatarova participants-9 participants from ISSP - 4	4848 CNRS, France, PICS	4 000 lv.
5	Optical study of multicomponent $\text{Ge}_x\text{Sb}(\text{As})_{40-x}\text{S}_{50}\text{Te}_{10}$ chalcogenide films by spectroscopic ellipsometry (2011)	Assoc.Prof. Dr V. Pamukchieva 2 participants from ISSP	EU-6FP No. ANNA_TA_UC9_RP001 Hungary	
6	Ellipsometric study of Si/SiO <sub>2</sub> structures, formed on H <sup>+</sup> plasma immersion implanted Si substrates (2011)	Assoc.Prof. Dr. A. Szekeres 1 participant from ISSP 1 - Techn. University	EU-6FP No. ANNA_TA_UC9_RP002 Hungary	
7	Structural characterization of defects in Si-based heterostructures (2011)	Assoc.Prof., Dr. A. Szekeres 1 participant from ISSP 1 - Techn. University	EC-6PII No. ANNA_TA_UC9_RP003 Italy	
8	Design of an improved Rayleigh surface acoustic wave (RSAW) resonator with gold electrode structure and improved corrosion immunity for sensor applications in highly reactive chemical gas-phase environment	Prof. DSc Ivan Avramov Number of participants from ISSP - 1	Framework of institute-to-institute cooperation Karlsruhe, Germany	5
9	Development of mass-sensitive quartz resonators for operation at cryogenic temperatures	Tzetan Angelov participants- 11 Number of participants from ISSP - 8	Framework of institute-to-institute cooperation Dubna	6
10	Overdoping of 1-2-3 HTS materials and	Prof. T. Troev; INRNE		

	its influence on the ac losses, critical current, flux pinning, activation energy	BAS, ISSP Members: 5	Euratom FU07	5144 BGN
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### 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 spectroscopy of ferroelectric and multiferroic materials	Prof. Dr.Sci. M. Gospodinov participants-6 participants from ISSP - 4	HAS	
2	Synthesis and investigation of multifunctional materials based on complex bismuth oxides and carbon allotrop compounds	Assoc. Prof. PhD T. Milenov participants-7 participants from ISSP - 7	RAS	
3	Investigation of hydroxyapatite-nanodiamond composite coating	Assoc. Prof. PhD E. Pecheva participants-11 participants from ISSP - 7	LAS	
4	Growth and characterization of hydroxyapatite composites as scaffolds for hard tissue regeneration	Assoc. Prof. PhD E. Pecheva participants-7 participants from ISSP - 4	HAS	
5	Study on strongly correlated electronic systems in laboratory and astrophysical plasma	N. Shamel participants-8 participants from ISSP - 3	FNRS – Valonie, Belgium	
6	Preparation and investigation of optical properties of semiconducting glasses for photonic applications (2011-2013)	Assoc. Prof. Dr. Z.G. Ivanova, 2 participants form ISSP	Czech Republic	

7	Optical and photoelectrical characterization of thin films and nanostructured layers based on ZnSe	Assoc. Prof. Dr. D. Nesheva, 4 participants from ISSP	Serbia	
8	Investigation of disordered materials based on Se-Te chalcogenide glasses by means of neutron diffraction and IR spectrophotometry (2010-2012)	Assoc. Prof. Dr. V. Pamukchieva Total participants - 6, From ISSP - 3 participants	Hungary	
9	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	
10	Multifunctional structures based on silicon dioxide prepared by evaporation and wet chemical methods for opto- and electronic-applications (2009-2011)	Assoc. Prof. Dr. A. Szekeres, 3 participants from ISSP and 7 participants from Institute of Physical Chemistry	Romania	
11	Structure and properties of new materials and thin films for nano-technologies in optoelectronics (2010-2012)	Assoc. Prof. Dr. A. Szekeres 5 participants from ISSP and 4 participants from Eotvos L. University	Hungary	
12	Silicon oxide films with embedded silicon nano-inclusions for advanced opto- and nanoelectronics applications (2010-2013)	Assoc. Prof. Dr. A. Szekeres, 4 participants from ISSP and 6 participants from Institute of Semiconductor Physics	Ukraine	
13	Characterization of diluted magnetic semiconductor nanostructured thin	Assoc. Prof. Dr. A. Szekeres,	Romania	



	films (2010-2012)	3 participants from ISSP and 6 participants from Institute of Atomic Physics		
14	Constant voltage stress degradation of TaHfO-mixed oxides, Serbia	Prof. DSc Elena Atanassova, 10 participasnts 5 from ISSP	Academy's bilateral agreement	
15	Traps in ultrathin (nanoscale) doped Ta <sub>2</sub> O <sub>5</sub> (HfTaO; TiTaO; AlTaO) and the effect of microwave treatement, Ukraine.	Prof. DSc Elena Atanassova, 8 participasnts 4 from ISSP	Academy's bilateral agreement	
16	Time-dependent dielectric breakdown in MIS capacitors with mixed high-k layers: TaAlO; TaHfO; TaTiO, Macedonia.	Prof. DSc Elena Atanassova, 8 participasnts 4 from ISSP	Academy's bilateral agreement	
17	Development of new sensitive layers (coatings) based on nano-sized semiconducting structures for analytical application using mass-sensitive piezoresonance sensors	Assoc. Prof. PhD Velichka Georgieva participants- 12 Number of participants from ISSP - 7	Academy's bilateral agreement	
18	Preparation and investigation of magnetic oxides thin films structures	Assoc. Prof. E. Vlahov ISSP members: 3	BAS –Polish AS	
19	Synthesis and structural investigations of multifunctional materials	Assoc. Prof. A. Stoyanova- Ivanova ISSP members:3	BAS - Estonian AS	
20	Thermal and magnetic properties of HT superconducting and related magnetic materials	Assoc. Prof. V. Lovchinov, ISSP members: 3	Bilateral agreement between BAS and CGRI, Belgium	
21	Nanostructured and bioactive liquid crystals	Acad. Alexander G. Petrov (6 participants)	BAS – CNR (Italy)	
22	Mechanical and flexoelectric properties of lipid membranes	Assoc. Prof. Dr. Marin D. Mitov (4 participants)	BAS – Russian Academy of Sciences	

23	Biophysical properties (structure, elasticity, interactions) of human erythrocyte ghosts and drug influence on them; giant vesicles as a simple model of ghosts	Assist. Prof. Dr. Victoria V. Vitkova (2 participants)	BAS – Austrian Academy of Sciences	
24	Etude des proprietes mecaniques par holographie digitale	Assist. Prof. Dr. Victoria V. Vitkova (2 participants)	BAS – WBI (Belgium)	
25	Space – time resolved structure of the low pressure hollow cathode discharge	Assist. Prof. Dr. V. Mihailov	Institute of Physics, Belgrade, Serbia	
26	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	
27	Plasma technologies and their applications	Acad. N.V.Sabotinov, Total – 4, ISSP - 2	Cooperation between the Polish Academy of Sciences and BAS	

## VI. Projects/contracts and commissions assigned from outsourcers, including state or private companies from the country or abroad

1	2	3	4	5
1	Investigation on XRD method employment for oxygen stoichiometry estimation of superconducting cuprates	Prof. T. Nedelcheva, Chem. Metal. Technical University- Sofia, ISSP Members: 1	HH 4-65/ 2010 -2011	2000 BGN
2	Bilateral cooperation ISSP BAS – University “Prof. A. Zlatarov” Burgas	Assoc. Prof. E. Nazarova ISSP Members: 3		
3	Bilateral cooperation ISSP BAS – Institute of Material Sciences BAS	Assoc. Prof. E. Nazarova ISSP Members: 3		