

**PLAN OF THE RESEARCH PROJECTS FOR 2012
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 2012
1	2	3	4	5

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

1	2	3	4	5
1	Termomechanical and magnetic properties and nonlinear excitations in condensed media	Prof. H. Chamati, DSc Participants - 7	BAS	
2	Phases and phase transitions in superfluids, magnetic and superconducting materials	Prof. D.I. Uzunov, 2 ISSP-2	BAS	
3	Growth and characterization of crystals and thin layers with optical, X-ray structural and electron-microscopic methods; doping and investigation of carbon nanostructures	Prof. Dr. Sci. Marin Gospodinov 7 total number of participants 7 participants from ISSP		
4	Electronic properties of solid state systems	Assoc. Prof. Dr K. Christova 10 total number of participants 6 participants from ISSP		
5	Biomaterials and surfaces: modification of solid surfaces by nanodiamond as	Assoc. Prof. Dr L. Pramatarova		

	models for the growth of implant coating	3 total number of participants 3 participants from ISSP		
6	Preparation, characterization and applications of new chalcogenide materials and thin films containing nanosized semiconductors	Prof. DSc D. Nesheva 12 participants	Budget	
7	Characterization of nano-sized and nano-structured dielectric and semiconductor films and heterostructures on their basis	Assoc. Prof. Dr. A. Sekeresh, 7 participants	Budget	
8	Physics and technology of thin and ultrathin dielectric and semiconductor layers for the modern microelectronics	Assoc. Prof. Dr. A. Paskaleva, total -12 participants from ISSP - 12		
9	Mass-, gas- and thermosensitivity of sensor systems and devices using different acoustic wave modes Bulk, Lamb, Rayleigh and Transverse surface acoustic waves	Assoc. Prof. Dr. V. Georgieva total -11 participants from ISSP - 11	Budget	
10	Materials and multifunctional magnetic materials	Prof. N. Tonchev ISSP members :14	budget subsidy of BAS	no
11	Photonics, optic and spectroscopy of anisotropic and nonlinear media	Prof. S.Rashev, D.Sc. 18	budget subsidy	
12	Mechanical and flexoelectrical properties and phenomena in thermotropic and lyotropic liquid crystalline systems	Prof. Isak Bivas, D.Sc. (7 participants)	Budget subsidy	-
13	Nanostructured and bioactive liquid crystals	Assoc. Prof. Yordan Marinov (4 participants)	Budget subsidy	
14	Physics of atoms, molecules and plasma	Prof. DSc. K. Blagoev 10/10		

15	Lasers, laser technologies and applications	Prof. N. Sabotinov, D.Sci. 14 participants	budget subsidy	
16	Identifying, registration and analysis of three-dimensional structure of biomacromolecules and cellular organelles based on bonding to sensors of a novel measuring equipment by conformal reactions	Leader: Assoc. Prof., PhD Gencho Minchev total number of part-s: 3 number of part-s from ISSP:2		

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, characterization and investigation of the physical properties of novel crystals with magneto-electric / multiferroic behavior in the systems Bi-Co(Ni)- Mn(Ru)-O and La-Co(Ni)-Mn(Ru)-O	Prof. Dr. Sci. Marin Gospodinov 19 total number of participants 7 participants from ISSP	TK-X-1712/2007	no
3	Nanostructured coatings – new biomaterials for bone implant obtained by a method of laser-liquid-solid interaction (nanobiocomposites)	Assoc. Prof. Dr L. Pramatarova 19 total number of participants 10 participants from ISSP	№ TK-X 1708/2007	15 000 lv.
4	Three –dimensional assemblies of semiconductor quantum dots : structure, optical, electrical and photoelectrical properties	Prof. DSc. D. Nesheva From ISSP: 4 participants	NSF, No BM-1	2 100 BGN
5	New amorphous and glassy materials based on Ge suitable for sensor	Prof. DSc. D. Nesheva, from ISSP: 4 participants	NSF, D002-123/2008	2 800 BGN .

	applications.			
6	Characterization of new chalcogenide materials by atomic force microscope	Assist. Prof. I. Bineva From ISSP: 3 participants	NSF, MDU-03-91	18 245 BGN
7	Trapping phenomena and long-term reliability of nano-scale metal gate/high- <i>k</i> dielectric based devices	Assoc. Prof. Dr. A. Paskaleva, total - 23 participants from ISSP, 5	DTK 02/50, NSF	Funds for 2012 (78 750 lv.) were obtained in Sept. 2011.
8	Strengthening of scientific and innovation capacity of ISSP BAS on multifunctional nanostructures	Acad. A. Петров / Doc. Dr. E. Vlahov	№ ДHC7ПП01/36 since 22.12.2011- (INERA)	7350.00 BGN
9	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: 4	ДО-02-352	66000.00 BGN
10	Deformability as a key feature of biological membranes and its alteration by biologically relevant factors – experimental studies on model systems	Assoc. Prof. Victoria Vitkova (4 participants)	Ministry of Education, Youth and Research, "Young scientists" - 2011; DMU03/80	28 708 lv
11	New techniques for quantum control and their applications	Assist. Prof. B. Torosov, 4/1	DMU 03/103	
12	Novel multi component glasslike tellurium matrices having variable nonlinear optical properties. (2008-2012)	Assoc. Prof. T. Petrov, PhD; total number – 12 from ISSP - 5;	NSF TK 02-305/19.12.2008	-
13	Laser methods for diagnostics in archeology (2009-2012)	Assoc. Prof. M. Grozeva, PhD total number – 28 from ISSP - 12	NSF TK 02-274/2008	-
14	Standardization of laser techniques for investigation and restoration of cultural	Assoc. Prof. M. Grozeva, PhD	NSF HTC 02-21/2010	9 000

	heritage (2011-2012)	total number – 11 from ISSP - 8	(Bulgarian-Romanian bilateral agreement)	
15	LIF analysis for cultural heritage investigation and conservation (2012-2013)	Assist. Prof. P. Zahariev, Ph.D. total number – 4 from ISSP - 3	NSF MY 03-126/20.12.2011	18 027
16	Dissemination and Development of Physics and Mathematics on the Balkans	Acad. D.Sc. A. G. Petrov	DNIM 01/94/12.12.2011	0
17	University Physics in Bulgaria (1889- 1949) Historical Study	Assist. Prof. G. Kamisheva	DNIM 01/95/12.12.2011	0

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

1	2	3	4	5
1	MOS radiation hardness increasing using post-oxidation cooling of Si-SiO ₂ structures	Prof. DSc S. Kaschieva From ISSP: 1 participant	Russia, Dubna International Institute of Nuclear Research	2000 USD

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

1	2	3	4	5
1	Optical imaging techniques for analyzing thick hydroxyapatite/nanodiamond composite layers for the study of biomineralisation	Assoc. Prof. Dr L. Pramatarova 9 total number of participants 6 participants from ISSP	PICS project № 4848 with CNRS, France	4 000 lv.
2	Overdoping of 1-2-3 HTS materials and its influence on the ac losses, critical	INRNE: Prof. T. Troev; ISSP coordinator: Doc.Dr.	EURATOM FU07--CT-2007-	7 000 BGN

	current, flux pinning, activation energy	E. Nazarova; ISSP members: 5		
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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	Investigation of multiferroic and relaxor-ferroelectric crystals	Prof. Dr. Sci. Marin Gospodinov 7 total number of participants 3 participants from ISSP	Research Institute of Solid State Physics and Optics (Hungary)	
2	Growth and characterization of hydroxyapatite composites as scaffolds for hard tissue regeneration	Assoc. Prof. Dr E. Pecheva 9 total number of participants 4 participants from ISSP	Bilateral project with Hungarian Academy of Sciences	
3	Investigation of hydroxyapatite - nanodiamond composite coating	Assoc. Prof. Dr E. Pecheva 8 total number of participants 6 participants from ISSP	Bilateral project with Latvian Academy of Sciences	
4	Optical and photoelectrical characterization of thin films and nanostructured layers based on ZnSe	Prof. DSc D. Nesheva, Total: 8 participants, 4 from Center for Solid State Physics and New Materials and 4 from ISSP	Serbia	
5	Investigation of disordered materials based on Se-Te chalcogenide glasses by means of neutron diffraction and IR	Assoc. Prof. Dr. V. Pamukchieva Total : 6 participants,	Hungary	

	spectrophotometry	from ISSP: 3 participants		
6	Preparation and infrared emission studies on rare earth-doped chalcogenide and heavy metal oxide glasses for optoelectronic applications	Assoc. Prof. Dr. Z. Ivanova, Total: 5 participants, 3 from Institute of Optics and Fine Mechanics, Shanghai, 2 from ISSP.	China	
7	Preparation and investigation of optical properties of semiconducting glasses for photonic applications	Assoc. Prof. Dr. Z. Ivanova, Total: 4 participants, 2 from Institute of Photonics and Electronics, Prague, 2 from ISSP.	Czech Republic	
8	Multicomponent chalcogenide semiconductors thin films suitable for phase change memory	Assoc. Prof. Dr. D. Arsova, Total: 8 participants, Ioffe Physico Technical Institute, St. Peterburg, from ISSP: 4 participants	Russia	
9	Structure and properties of new materials and thin films for nano-technologies in optoelectronics	Assoc. Prof. Dr. A.M. Szekeres, Total: 9 participants, Eotvos L. University, from ISSP: 5 participants	Hungary	
10	Silicon oxide films with embedded silicon nanoinclusions for advanced opto- and nanoelectronics applicatios	Assoc. Prof. Dr. A.M. Szekeres, Total: 11 participants, Institute of Semiconductor Physics, from ISSP: 4 participants	Ukraine	
11	Characterization of diluted magnetic semiconductor nanostructured thin films	Assoc. Prof. Dr. A.M. Szekeres, Total: 10 participants,	Romania	

		Institute of Atomic Physics, from ISSP: 4 participants		
12	Ion beam modification of semiconductor surface layer for micro- and optoelectronics application purposes	Assoc. Prof. Dr. A.M. Szekeres, Total: 14 participants, Institute of Physical Chemistry, from ISSP: 6 participants	Romania	
13	Traps in nanoscale films of doped Ta ₂ O ₅ (HfTaO; TiTa; AlTaO) and the effect of microwave irradiation (2.45-24 GHz).	Prof. DSc. Ph.D. E. Atanassova, total – 8 participants, from ISSP – 4.	Academy's bilateral agreements, Ukraine	
14	Time-dependent-dielectric breakdown of MIS capacitors with mixed high- <i>k</i> layers: TaAlO; TaHfO; TaTiO	Prof. DSc. Ph.D. E. Atanassova, total – 8 participants, from ISSP– 4.	Academy's bilateral agreements, Republic of Macedonia	
15	Dynamic aspects of electrical breakdown of memory capacitors based on high- <i>k</i> Hf- and Al-doped Ta ₂ O ₅	Prof. DSc. Ph.D. E. Atanassova, total – 11 participants, from ISSP – 5.	Academy's bilateral agreements, Serbia	
16	Investigation of resistive switching effect in MIM structures with TaO _x - and TiO _x -based dielectrics for future memory applications.	Assoc. Prof. Dr. A. Paskaleva, total -9 participants from ISSP – 4.	Academy's bilateral agreements, Slovakia	
17	Development of new sensitive layers (coatings) based on nano-sized semi-conductive structures for analytical application using mass-sensitive piezoresonance sensors	Assoc. Prof. Dr. V. Georgieva total -11 participants from ISSP – 6.	Academy's bilateral agreements, Russia	
18	Investigation of impurities in helium	Ts. Yordanov, total -11	Academy's bilateral agreements,	

	gases on the base of quartz crystal microbalance	participants from ISSP – 8.	Russia	
19	Electrical and magnetic properties of perovskite magnetic materials	Doc. Dr. V. Lovchinov; ISSP members: 4	Bilateral agreement between BAS and CGRI, Belgium	
20	Structural and physical investigations on nanostructural layers and bulk porous materials based on dielectric matrix	Doc. Dr. V. Lovchinov; ISSP members: 4	Russia	
21	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	Assoc. Prof. Victoria Vitkova (1 participant)	BAS – WBI, Université Libre de Bruxelles (Belgique)	
22	Mechanical and electrostatic properties of lipid membranes: influence of the ionic composition of the electrolyte on the characteristics phosphatidylserine-containing membranes	Prof. Isak Bivas, D.Sc. (4 participants)	BAS – Russian Academy of Sciences	
23	Nanostructured and bioactive liquid crystals	Acad. Alexander G. Petrov (5 participants)	CNR Universita della Calabria, Italy	
24	Preparation and study of organic nanostructures for optoelectronics	Assoc. Prof. Yordan Marinov, (6 participants)	RAS-General Physics Institute, Moscow	
25	Time and space distribution investigation of hollow cathode glow discharge	Assoc. Prof. V. Mihailov 1/1	Institute of Physics, Belgrade, Serbia	
26	Laser technologies and their application (2012 - 2014)	Prof. N. Sabotinov, D.Sci. 7 participants 4 from ISSP, BAS	ISSP, BAS – Lab. MVL Institute of Fluid Flow Machinery, PAN, Gdansk	
27	Targeted synthesis of functional materials with special electrical, optical and magnetic properties	Assoc.Prof. Dr. T.I. Milenov 5 participants from ISSP	Institute of General and Inorganic Chemistry, Russian Academy of Sciences, Moscow, Russia	