



Institute of Problems of Mechanical Engineering  
of Russian Academy of Sciences

**Second International Workshop**

**"NUCLEATION AND NON-LINEAR PROBLEMS  
IN FIRST-ORDER PHASE TRANSITIONS"  
(NPT'2002)**

**PROGRAMME**

1 July - 5 July 2002  
St. Petersburg (Russia)

## Monday, JULY 1

9:00	9:30	<b>REGISTRATION</b>
9:30	10:00	<b>Opening Ceremony</b> Academician D.M.Klimov, Prof. S.A.Kukushkin, Academician A.I. Rusanov, Prof. J.L.Katz
10:00	13:10	<b>PLENARY SESSION</b>
10:00	11:10	<b>Part I (Chairman: Prof. S.A. Kukushkin)</b>
10:00	10:35	H. Reiss "Phase transitions in systems as small as clusters: some remarkable findings"
10:35	11:10	J.L. Katz "Open questions in nuclear phenomena"
11:10	11:25	<i>COFFEE BREAK</i>
11:25	13:10	<b>Part II (Chairman: Prof. J.L. Katz)</b>
11:25	12:00	A.I. Rusanov "Nano-thermodynamics"
12:00	12:35	J.K. Lee "Role of coherency strain in solid-state phase transformations"
12:35	13:10	S.A. Kukushkin, A.V. Osipov "Thermodynamics and kinetics of the switching effects in ferroelectrics"
13:10	14:25	<i>LUNCH BREAK</i>
14:25	15:45	<b>Volume Section (oral, Chairman: Dr. E.V. Kalashnikov )</b>
14:25	14:45	J. Bohr "First order phase transitions in proteins"
14:45	15:05	I.L. Maksimov, <u>Atsushi Mori</u> , Futoshi Shirazawa "Solid-liquid interface: stability limits and propagation kinetics"
15:05	15:25	D.A. Semagin, S.V. Dmitriev, K. Abe, T. Shigenari "Second-order type symmetry breaking preceding the first order incommensurate to $\alpha$ -phase transition in quartz"
15:25	15:45	V. Erukhimovitch, M. Talyshinsky, E. Souprun, M.Huliehel "Development kinetics of herpes viruses infection"
15:45	16:00	<i>COFFEE BREAK</i>
16:00	17:40	<b>Volume Section (oral, Chairman: Prof. A.P. Grinin)</b>
16:00	16:20	I.A. Zhuvikina, A.P. Grinin, F.M. Kuni "Stochastic regularities of ebullition in gas-supersaturated liquid solutions"
16:20	16:40	V.B. Kurasov "Explicit role of density profiles in nucleation kinetics"
16:40	17:00	I.L. Maksimov "Critical behavior near depinning threshold: critical indices and Landau-type expansion"
17:00	17:20	E.D. Eidelman "Theory of the first-order phase transition into gas in the electrical field of prebreakdown state"
17:20	17:40	I. Avramov "Thermodynamic variables in relativity theory"
14:25	15:45	<b>Surface Section (oral, Chairman: Dr. A.V. Osipov)</b>
14:25	14:45	V.M. Ievlev, E.V. Shvedov, G.V. Merkulov "The diffusion layering of two-component films of Cu-Ag and Si-As"
14:45	15:05	M.Sh. Akchurin, R.V. Galiulin, V.R. Regel "Transformation of single crystal to nanocrystal structure by indentation"
15:05	15:25	B.I. Kidyarov "Theoretical analysis of crystal formation in electrolyte solutions"
15:25	15:45	A. Petrov, I. Kudrenickis, M. Maiorov "Magnetic phase transitions in Ni fine

		particles”
15:45	16:00	<i>COFFEE BREAK</i>
16:00	16:40	<b>Surface Section (oral, Chairman: Prof. A.V. Dvurechenskii )</b>
16:00	16:20	R.A. Suris, <u>V.B. Korsakov</u> “Kinetics of nucleation in condensed phases from gas under low supersaturation”
16:20	16:40	E.V. Shvedov “Kinetics of the growth of thin metal films at nanocluster level”
14:25	16:40	<b>Mechanics Section (oral, Chairman: Prof. J.K. Lee)</b>
14:25	14:45	E.L. Aero “Bifurcation theory of nondiffusive transitions in monocrystals”
14:45	15:05	N.G. Bourago, <u>V.N. Kukudzhanov</u> “Study of thermal damage processes in elastic plastic materials”
15:05	15:25	M. Perelmuter “Large model of interface crack nucleation and growth”
15:25	15:45	<u>Yu.A. Komysa</u> , M.A. Belogolovskii, G. Ya. Akimov “Continuum field model of nucleation and growth of a new phase in an elastic amorphous medium”
15:45	16:00	<i>COFFEE BREAK</i>
16:00	16:40	<b>Mechanics Section (oral, Chairman: Prof. E.L. Aero)</b>
16:00	16:20	A.L. Korzhenevskii “Morphological instabilities of moving extended manifolds”
16:20	16:40	<u>V.I. Vettegren</u> , V.N. Svetlov, G.I. Morozov “Kinetics and hierarchy of fracture process of metals”
		<b>Poster</b>
		I.A. Kaplunov “Structural defects and optical properties of germanium single crystals”
		Yu.M. Smirnov, I.A. Kaplunov, A.I. Kolesnikov “Growth of germanium single crystals for infrared optics”
		<u>S.V. Némenat</u> , S.A. Kukushkin “The influence of solution acidity on precipitation kinetics”
		<u>V.D. Alexandrov</u> , A.A. Barannicov, S.A. Frolova “A thermographic method of determining the nucleation parameters at the crystallization of overcooled melts”
		<u>A.G. Ambrok</u> , S.A. Kukushkin “Initial stage of electrocrystallization of metals”
		<u>M.V. Sorokin</u> , A.E. Volkov “Nucleation of nanoislands”
		A.B. Kaplun, <u>B.I. Kidyarov</u> , A.B. Meshalkin “Influence of melt dissociation on nucleation kinetics for complex oxide compounds”
<b>TUESDAY, JULY 2</b>		
10:00	13:10	<b>PLENARY SESSION</b>
10:00	11:10	<b>Part I (Chairman: Prof. B.I. Kidyarov)</b>
10:00	10:35	V.P. Skripov “Continuity disturbance of gas-saturated polymer (polymethyl methacrylate – CO <sub>2</sub> )”
10:35	11:10	Yu.D. Tretyakov “A nonlinear dynamics approach to new materials and technics formation”
11:10	11:25	<i>COFFEE BREAK</i>
11:25	13:10	<b>Part II (Chairman: Prof. V.P. Skripov )</b>
11:25	12:00	<u>P. Müller</u> , R. Kern. “Some aspects of coherently-strained epitaxial deposits: a

		thermodynamical approach of crystal growth and surface melting”
12:00	12:35	B.J. Mokross “Nucleation theory and small system thermodynamics”
12:35	13:10	A.V. Neimark “Phase transitions and nucleation in nanoconfinements”
13:10	14:25	<i>LUNCH BREAK</i>
14:25	15:45	<b>Volume Section (oral, Chairman: Prof. F.G. Shi)</b>
14:25	14:45	M.Sh. Akchurin, P.P. Fedorov “Oscillation regime of yttrium-aluminium garnet melt crystallization”
14:45	15:05	B.I. Kidyarov, I.V. Nikolaev “Study into the nucleation kinetics in melt by the method of statistical thermal analysis”
15:05	15:25	V.D. Alexandrov, N.A. Volodin, S.A. Frolova, V.A. Postnicov “A mathematical model of the overcooled melts crystallization with an incubation period of nucleation”
15:25	15:45	S.P. Fisenko, M. Rusyniak, M.S. El-Shall “Oscillatory nucleation in diffusion cloud chamber. Theory and experiment”
15:45	16:00	<i>COFFEE BREAK</i>
16:00	17:40	<b>Volume Section (oral, Chairman: Dr. P. Demo)</b>
16:00	16:20	Atsushi Mori, Futoshi Shirazawa, Naohisa Inoue “Non-equilibrium molecular dynamics simulation of crystal-melt interfaces”
16:20	16:40	Atsushi Mori, Brian B. Laird, Yoshihiro Kangawa, Tomonori Ito, Akinori Koukitu “Gibbs-Duhem integration technique in semigrand canonical ensemble”
16:40	17:00	E.V. Kalashnikov, M.Yu. Kantor, A.A. Bugaev “Phase transitions in metallic foils under power laser radiation”
17:00	17:20	A.V. Reshetnikov, V.P. Skripov, V.P. Koverda, V.N. Skokov “Fluctuation phenomena under destroying of metastable state of jets of superheated liquids”
17:20	17:40	N. Petropavlov “Nucleation and crystal growth in the polymorphic transition”
14:25	15:45	<b>Surface Section (oral, Chairman: Prof. S.P. Fisenko)</b>
14:25	14:45	A.V. Dvurechenskii, R. Groetzschel, Zh. Smagina, V.A. Zinoviev, P. Novikov, S.A. Tyes “Ge/Si nanostructures with quantum dots grown by ion-beam assisted heteroepitaxy”
14:45	15:05	A.P. Belyaev, V.P. Rubets, I.P. Kalinkin “Mechanism of ordering of the newly formed phase disperse particles at the condensation from vapor under strictly nonequilibrium conditions”
15:05	15:25	V.D. Alexandrov, I.V. Sel'skaya, S.A. Frolova “An electronic and microscopic study of the nucleation kinetics at the crystallization of selenium amorphous films”
15:25	15:45	A.V. Shapurko, K.E. Nietering, R.E. Soltis “Identification of limiting factors of mass transfer through solid body”
15:45	16:00	<i>COFFEE BREAK</i>
16:00	16:20	<b>Surface Section (oral, Chairman: Prof. I.P. Kalinkin)</b>
16:00	16:20	V.V. Kidalov, G.A. Sukach, A.C. Revenko, A.A. Petukhov “GaN thin films luminescence which have been growing by radical-ray epitaxy”
16:20	16:40	A.I. Kharlamov, S.V. Loytshenko, S.N. Kaverina “Synthesis of tubular and toroidal nanostructures of silicon carbide”
14:25	15:45	<b>Mechanics Section (oral, Chairman: Prof. V.N. Kukudzhyanov)</b>
14:25	14:45	A.M. Lomonosov, P. Hess “Impulsive fracture of silicon by laser-generated elastic surface pulses with shocks”
14:45	15:05	S.A. Kukushkin “Micropores and cracks nucleation in brittle materials at the

		initial stages. Formation of microcracks in silicon”
15:05	15:25	N.F. Morozov, D.A. Indeitsev, <u>Y. Mochanova</u> “The influence of trapped modes for increases of nanoislands in thin films”
15:25	15:45	S. Santucci, A. Guarino, R. Scoretti, P.-Ph. Cortet, <u>L. Vanel</u> , S. Ciliberto “Thermal activation of rupture and slow crack growth in disordered materials”
15:45	16:00	<i>COFFEE BREAK</i>
16:00	16:40	<b>Mechanics Section (oral, Chairman: Prof. V.I. Vettegren )</b>
16:00	16:20	A. N. Fedorova , <u>M.G. Zeitlin</u> “From localization to stochastics in BBGKY collective dynamics”
16:20	16:40	V.A. Eremeyev “On the phase transformations in multi-component elastic media”
		<b>Poster</b>
		<u>S.V. Dmitriev</u> , T. Shigenari “Intrinsic localized modes as a precursor of the first-order phase transition”
		<u>Bityutskaya L.A.</u> , Mashkina E.S. “Nonequilibrium magnetothermodynamics effects during melting and solidification of ionic crystals”
		S.A. Kukushkin, A.V. Osipov, <u>V.V. Spirin</u> , F.J. Mendieta “Switching processes and aging mechanisms in ferroelectrics films”
		<u>A.V. Gartvik</u> , B.F. Borisov, E.V. Charnaya, Yu.A. Kumzerov “Freezing and melting of gallium in confined geometry”
		<u>E.B. Shadrin</u> , L.O. Khrustalkova, K.Sh. Tsibadse, I.O. Timofeeva, A.I. Sidorov, A.V. Ilinskii “Interferometer with a metal - semiconductor phase transition as nonlinear laser mirror and optical limiters”
		<u>D.N. Korolev</u> , A.E. Volkov “Nanoprecipitation in thermal spikes caused by swift heavy ions in supersaturated solid solutions”

## WEDNESDAY, JULY 3

10:00	16:20	<b>PLENARY SESSION</b>
10:00	11:45	<b>Part I (Chairman: Prof. Yu.D. Tret'yakov)</b>
10:00	10:35	<u>T. Shigenari</u> , K. Abe “Strong first order phase transitions studied by Raman and fluorescence spectroscopy”
10:35	11:10	V.V. Slyozov “Theory of nucleation under gradual formation of supersaturation”
11:10	11:45	<u>A.V. Osipov</u> , F. Schmitt, S.A. Kukushkin, P. Hess “Stress-driven nucleation of coherent islands: theory and experiment”
11:45	12:00	<i>COFFEE BREAK</i>
12:00	13:45	<b>Part II (Chairman: Prof. B.J. Mokross)</b>
12:00	12:35	<u>A.I. Nikiforov</u> , O.P. Pchelyakov, V.A. Cherepanov, V.V. Ulyanov “The variation of surface morphology and in plane lattice constant of Ge films on Si during MBE”
12:35	13:10	V.A. Shneidman “Time-dependent nucleation: analytical results and experimental applications “
13:10	13:45	V.P. Zlomanov “Specialities of growth of semiconductor crystals on vapor-gas-liquid-crystal mechanism”
13:45	14:00	<i>COFFEE BREAK</i>
14:00	16:20	<b>Part III (Chairman: Prof. A.Yu. Zakharov)</b>

14:00	14:35	V.N. Skokov and V.P. Koverda “1/f noise under nonequilibrium first order phase transitions”
14:35	15:10	B.D. Summ “Formation of surface layer of liquids as a first-order phase transition”
15:10	15:45	V.G. Baidakov “Nucleation in the melts: results and problems”
15:45	16:20	S.P. Fisenko, G.Wilemski “Kinetics of binary nucleation in cluster size and composition space”
18:30		<b>BANQUET</b>
<b>THURSDAY, JULY 4</b>		
10:00	13:10	<b>PLENARY SESSION</b>
10:00	11:10	<b>Part I (Chairman: A.I. Rusanov)</b>
10:00	10:35	F.G. Shi “Nucleation free energy barrier: non-monotonic temperature dependence and its interconnection to nanocrystallization & glass transition”
10:35	11:10	J.W.P. Schmelzer “Comments on the nucleation theorem”
11:10	11:25	<i>COFFEE BREAK</i>
11:25	13:10	<b>Part II (Chairman: Prof. I. Avramov)</b>
11:25	12:00	I. Avramov, E. Zanotto “Critical cooling rate and crystallization parameter of glassforming systems”
12:00	12:35	S. Toxvaerd “Molecular dynamics simulation of homogeneous and heterogeneous nucleation”
12:35	13:10	B.I. Kidyarov “Statistical investigation of nucleation kinetics in aquosystem by the method of many samples”
13:10	14:25	<i>LUNCH BREAK</i>
14:25	15:45	<b>Volume Section (oral, Chairman: Dr. J.W.P. Schmelzer)</b>
14:25	14:45	B.B. Straumal, V.G. Sursaeva, S.A. Polyakov “Grain boundary faceting phase transitions in Cu and Zn”
14:45	15:05	N.V. Kirillova, V.V. Fomenko “Heterophase reactions of nanofilaments synthesis of aluminium boron-containing compounds”
15:05	15:25	V.Ya. Shur “Domain wall motion in ferroelectrics: effect of correlated nucleation”
15:25	15:45	S.A. Kukushkin, M.A. Zakharov “Thermodynamics and kinetics of the switching effects in ferroelectrics-ferroelastics”
15:45	16:00	<i>COFFEE BREAK</i>
16:00	17:40	<b>Volume Section (oral, Chairman: Prof. V.P. Zlomanov )</b>
16:00	16:20	G.Th. Guria “Nucleation and far from equilibrium phase transitions in human blood dynamics”
16:20	16:40	A.I. Gusev “Ordering in strongly nonstoichiometric compounds as the first-order phase transition”
16:40	17:00	M. Kshevetskiy, A.K. Shchekin “An analytical and numerical investigation of combined effects of external and internal electric field in nucleation on charged particles”
17:00	17:20	S.P. Fisenko, R. Heist “The puzzle of high pressure nucleation experiments in diffusion cloud chamber”

17:20	17:40	V.M. Fokin, O.V. Potapov, V.L. Ugolkov, E.D.Zanotto, F.M. Spiandorello Kinetics of the solid solutions crystallization in soda-lime-silica glasses
17:40	18:00	A.M. Sveshnikov, P. Demo, K. Nitsch, M. Rodová, Z. Kožišek “How to keep track on solidification of a supercooled melt”
14:25	15:45	<b>Surface Section (oral, Chairman: Prof. E.D. Eidelman)</b>
14:25	14:45	R. Jayaganthan, G.-M. Chow “Anomalous X-ray scattering study and thermodynamic modeling of nanostructured Ni-Co system”
14:45	15:05	L.D. Grigor'eva “structure and the phase state of solid solutions at a solid-state-gas interface”
15:05	15:25	G.V. Kolmaskov, A.A. Levchenko, L.P. Mezhov-Deglin, V.B. Shikin “Static and dynamic phenomena on the charged surface of liquid hydrogen droplet”
15:25	15:45	M.V. Ryabov, V.P. Morozov, I.L. Maksimov “Kinetics of mass transfer in melts at the spatially – nonuniform distribution of grains”
15:45	16:00	<i>COFFEE BREAK</i>
16:00	16:40	<b>Surface Section (oral, Chairman: Dr. I.L. Maksimov)</b>
16:00	16:20	I.I. Pronin, M.V. Gomoyunova, D.A. Valdaitsev, N.S. Faradzhev “Structural transformation of the near-surface region of layered crystals due to spontaneous intercalation”
16:20	16:40	D. Tatianenko, A.K. Shchekin “Barrier and barrierless nucleation on incompletely wettable particles: interface displacement approach”
16:00	16:20	M.P. Anisimov, Z.N. Esina, Ph.K. Hopke “Impact of nucleation rate surface topology researches on nucleation theory”
16:20	16:40	<b>Poster</b>
		M.G.Shlyagin, S.A.Kukushkin, I.M. Borbon, P.Swart “Influence of high-powered UV light pulse onto the optic fiber”
		S.K. Gordeev, Yu.V. Pavlov, S.A. Kukushkin “Macrokinetic description of pyrocarbon matrix nanocomposites preparation”
		M.P. Anisimov, Z.N. Esina, Ph.K. Hopke “Some general requirements for nucleation rate experiments”
		M.P. Anisimov, Shaimordanov, A. Tretyakov, V. Murashkin, Z. Esina “1-pentanol - helium experimental nucleation rates”
		M.P. Anisimov, Yu.N. Zacharov, A.S. Vasilyev, Ph.K. Hopke “Nucleation rate surface topology for partially miscible binary systems”
		V.B. Kurasov “Further analytical investigations of nonisothermal nucleation”
<b>FRIDAY, JULY 5</b>		
10:00	13:10	<b>PLENARY SESSION</b>
10:00	13:10	<b>Part I (Chairman: Prof. V.V. Slyozov)</b>
10:00	10:35	P. Demo, A.M. Sveshnikov, K. Nitsch, M. Rodová, Z. Kožišek “Why melts are supercoolable? (Theoretical and experimental results)”
10:35	11:10	A.K. Shchekin, F.M. Kuni, A.I.Rusanov “General regularities of nucleation on soluble particles”
11:10	11:25	<i>COFFEE BREAK</i>
11:25	13:10	<b>Part II (Chairman: Prof. S. Toxvaerd)</b>
11:25	12:00	A.I. Olemskoi “Self-organized criticality within fractional Lorenz scheme”
12:00	12:35	R.S. Berry, B.M. Smirnov “Aggregate and glassy-like states of systems of

		atoms with a pair interaction”
12:35	13:10	A.Yu. Zakharov “Quasiparticles, random fields, and phase transitions in classical statistical mechanics”
13:10	14:25	<i>LUNCH BREAK</i>
14:25	15:45	<b>Volume Section (oral, Chairman: Prof. A.K. Shchekin)</b>
14:25	14:45	S. El-Shall “Ion induced nucleation in supersaturated vapors”
14:45	15:05	N.M. Kortsenstein, E.V. Samuilov “Condensational relaxation of supersaturated vapor: an investigation of thermodynamic parameters pulsations effect”
15:05	15:25	V.M. Ievlev, E.V. Shvedov, D.E. Andrushevich “Kinetics of crystallization thin films during vacuum condensation on the defect of the crystal substrate”
15:25	15:45	B.B. Straumal, “Grain boundary phase transitions”
15:45	16:00	<i>COFFEE BREAK</i>
16:00	17:40	<b>Volume Section (oral, Chairman: Prof. B.M. Smirnov)</b>
16:00	16:20	V.D. Alexandrov, V.A. Postnicov “Analyses of changes of Gibbs free energy at the nucleation of crystals with a real structure in the process of crystallization of melts”
16:20	16:40	M.V. Krasin'kova “On the electron origin of phase transition in doped magnetites. (from pm and semiconductor to fm and metal conductivity)”
16:40	17:00	A.S. Shirinyan, A.M. Gusak “Nucleation and separation in supersaturated alloys with constraints”
14:25	15:45	<b>Surface Section (oral, Chairman: Prof. V.D. Alexandrov)</b>
14:25	15:05	I.P. Pronin, E.Yu. Kaptelov, S.A. Kukushkin, A.V. Osipov “Kinetic pyrochlore-perovskite phase transformation in lead titanate-zirconate thin films”
15:05	15:25	S.A. Vakulenko, B. Kazmierczak “Biological morphogenesis and phase transition theory”
15:25	15:45	S.Yu. Karpov, I.A. Matukov, M.S. Ramm “Nucleation and 2D island evolution during GaAs(001) growth by MBE”
15:45	16:05	M.P. Anisimov “Topologies of semiempirical nucleation rate surfaces”
15:45	16:00	<i>COFFEE BREAK</i>
16:00	17:20	<b>Surface Section (oral, Chairman: Dr. A. Petrov)</b>
16:00	16:20	I.L. Maksimov, S. Saikov “Kinetics of the nucleation on the substrate”
16:20	16:40	V.A. Petrovsky, S.A. Troshev, A.S. Maltsev, A.E. Suharev “Nonlinear processes mass-transfer in crystal forming system and defects of crystals”
16:40	17:00	V.B. Kurasov “Nucleation process in the system with many types of heterogeneous centers”
17:00	17:20	E.A. Zubova, N.K. Balabaev, L.I. Manevitch “Does dielectric $\alpha$ -C relaxation indicate phase transition from orthorhombic to 'rotational' phase in polyethylene crystal?”
17:20	17:40	<b>Closing Ceremony</b>