

**THE OPTIMIZATION OF
COMPOSITION, STRUCTURE
AND PROPERTIES OF METALS,
OXIDES, COMPOSITES,
NANO- AND AMORPHOUS
MATERIALS**

**PROCEEDINGS OF THE FOURTH
ISRAELI-RUSSIAN BI-NATIONAL
WORKSHOP 2005**

June 19-25

**Jerusalem - Tel-Aviv
2005**

Israeli Academy of Sciences and Humanities

Russian Academy of Sciences

College of Judea and Samaria, Ariel, Israel

**Institute of Metallurgy, Ural Branch of Russian Academy of
Sciences, Ekaterinburg, Russia**

**THE OPTIMIZATION OF
COMPOSITION, STRUCTURE AND
PROPERTIES OF METALS, OXIDES,
COMPOSITES, NANO- AND
AMORPHOUS MATERIALS**

**FOURTH ISRAELI-RUSSIAN BI-NATIONAL
WORKSHOP 2005**

June 19 - 25

**Jerusalem - Tel-Aviv
2005**

The optimization of composition, structure and properties of metals, oxides, composites, nano- and amorphous materials. Proceedings of the Fourth Israeli-Russian bi-national Workshop 2005. - Jerusalem – Tel Aviv, 2005.

The book contains the results of investigations carried out in the field of physical chemistry of condensed matter.

The Workshop is organized and supported by

Israeli Academy of Science and Humanities
Russian Academy of Science
College of Judea and Samaria, Ariel, Israel
Institute of Metallurgy of the Ural Branch of Russian Academy of Science

Main editors:

Dean of the Natural Sciences Faculty,
Head of the Materials Research Center, College of Judea and Samaria
M.Zinigrad

Corresponding member of Russian Academy of Sciences
E.A. Pastukhov

© Ural Branch of Russian Academy of Sciences, 2005

CONTENTS

EFFECTS OF STRAIN AND ANNEALING TEMPERATURE ON CRITICAL CURRENT DENSITIES IN Cu/MgB ₂ and Ni/MgB ₂ SUPERCONDUCTORS	5
V. Beilin, M. Roth, E. Dul'kin, E. Yashchin, Y. Lapides, J. Greenberg, E. Mojaev, M. Tsindlekht, E. Galstyan, Y. Felner	
ZERO-FIELD SPLITTINGS FORMED BY ANTISYMMETRIC DOUBLE EXCHANGE IN MIXED-VALENCE [Fe(II)Fe(III)] CLUSTER	17
Moshe Belinsky	
SUBMICROMETRIC PATTERNING IN EVAPORATED POLYMER SOLUTIONS: PHYSICAL MECHANISMS AND INFLUENCE OF THE MOLECULAR WEIGHT	37
Ed. Bormashenko, R. Pogreb, O. Stanevsky, Ye. Bormashenko, O. Gendelman	
MESOSCOPIC AND SUBMICROMETRIC ORDERING IN EVAPORATED POLYMER FILMS: INFLUENCE OF THE SURFACE DEFECTS	46
Ed. Bormashenko, R. Pogreb, O. Stanevsky, Ye. Bormashenko, T. Stein, N. Litvak, A. Shulzinger, O. Gendelman	
EFFECT OF SEVERE PLASTIC DEFORMATION ON STRUCTURE AND STOICHIOMETRY OF SOME OXIDES OF TRANSITION METALS	56
N.M. Chebotaev, A. Gedanken, B.A. Gizhevskii, A.V. Fetisov, A.Ya. Fishman, E.A. Kozlov, T.E. Kyrennykh, L.I. Leontiev, S.V. Naumov, A.M. Patselov, S.A. Petrova, V.P. Pilugin, V.B. Vykhodets, R.G. Zakharov, M.I. Zinigrad	
LOW-TEMPERATURE OXIDATION-REDUCTION PROPERTIES OF YBa ₂ Cu ₃ O _{6+δ}	76
A.V. Fetisov, E.A. Pastukhov, V.B. Fetisov	

MELTING AND GLASS-LIQUID TRANSITION IN 2D AND 3D PARTICLE MODELS. O.V.Gendelman, Al.Al.Berlin, L.I.Manevitch, M.A.Mazo, N.K.Balabaev	85
OPTICAL JAHN-TELLER EFFECT IN II-VI COMPOUNDS DOPED WITH Cr ²⁺ ION S.I. Klokishner, B.S. Tsukerblat, O.S. Reu, A.V. Pali, S.M. Ostrovsky	103
FEATURES OF CORED WIRE HEATING AT ELECTRO ARC METALLIZATION Yu. Korobov, M. Shalimov, V. Shymiakov	120
INVESTIGATIONS OF CRYSTAL GROWTH PROCESSES IN THE NIKOLAEV INSTITUTE OF INORGANIC CHEMISTRY F.A. Kuznetsov, Ya.V.Vasiliev, A.A.Pavlyuk, M.L.Kosinova	130
KINETICS AND DYNAMICS OF ION INSERTION INTO HOST ELECTRODES FOR RECHARGEABLE Li AND Mg BATTERIES M.D. Levi, Y. Gofer, E. Levi and D. Aurbach	147
MECHANOCHEMICAL MIXING IN IMMISCIBLE METALLIC SYSTEMS N. Lyakhov, T. Grigorieva	163
EXPERIMENTAL TESTING OF A NEW APPROACH TO THE DEVELOPMENT OF WELDING MATERIALS V. Mazurovsky, M. Zinigrad, L. Leontiev	177
PRINCIPLES OF MODELING FOR COMPUTER-AIDED DESIGN OF WELDING MATERIALS V. Mazurovsky, M. Zinigrad, L. Leontiev	192
OPTIMISATION AND EXPANSION OF APPLICATION AREA OF N-ARYL-3-AMINOPROPIONIC ACIDS COMPLEXES WITH COPPER(II) IN CHEMICAL ANALYSIS E.V.Osintseva, N.V.Pechishcheva, L.K.Neudachina, K.Yu. Shunyaev, Yu.G.Yatluk, A.A.Vshivkov, L.I.Leontiev	207

THE ACCOUNT OF UNSTEADY CONDITIONS AT MODELLING OF HEAT-TRANSFER WITH USING OF FINITE-DIFFERENCE METHODS I.V. Pershin, S.M. Shanchurov, G.I. Shishkin, V.V. Yakovlev	212
RADIATION PROPAGATION IN SLAB DIELECTRIC MEDIA Yosef Pinhasi, Asher Yahalom, Sergey Petnev	227
IS THERE PHONON BOTTLENECK IN QUANTUM DOTS? S.E. Schacham, E. Finkman	240
EUTECTIC EQUILIBRIA IN MULTICOMPONENT SYSTEMS K. Yu. Shunyaev	252
HYDROGEN TRAPPING IN B-21S TITANIUM ALLOY E. Tal-Gutelmacher, D. Eliezer	258
X-RAY FLUORESCENCE DETERMINATION OF SULFUR IN MOLYBDENUM-CONTAINING OXIDE MATERIALS K.V. Tsibart, N.V. Pechishcheva, A.V. Golovkov, T.G. Poleva, K.Yu. Shunyaev	271
THEORETICAL BASE AND METHOD OF STUDYING OF LIQUID AND GAS PHASES INTERACTION DURING THE REDUCTION OF METAL OXIDES FROM THE MELTS BY GAS IN BUBBLED LAYER A.S. Vusikhis, A.N. Dmitriev, D.Z. Kudinov, L.I. Leontiev	276
DEUTERIUM SOLUBILITY AND ISOTOPE EFFECT FOR H/D UPTAKE IN PROTON-CONDUCTING OXIDES $La_{1-y}Sr_ySc_{1-y}Mg_yO_{3-\alpha}$ V.B. Vykhodets, T.E. Kurennykh, V.I. Tsidilkovski, V.P. Gorelov, A.Yu. Stroeveva, A. Ya. Fishman	284
OPTIMIZATION OF THE COMPOSITION OF MATERIALS FOR PULSE SHAPING A. Yahalom, Y. Pinhasi	294
DIRECTED SYNTHESIS OF FINE-LAYER COATINGS, HERMETICS AND NANOCOMPOSITES BY MEANS OF CHEMICAL REACTIONS IN OXIDE MELTS V.Zhabrev	323