

Radiation and Nuclear Techniques in Material Science

Selected, peer reviewed papers from the Conference on Physical-Technical Problems of Nuclear Science, Energy Generation and Power Industry, (PTPAI 2014), June 5-7, 2014, Tomsk, Russia

von
Oleg Dolmatov

1. Auflage

Trans Tech Publications 2015

Verlag C.H. Beck im Internet:
www.beck.de

ISBN 978 3 03835 376 8

Table of Contents

Preface and Conference Organization

Chapter 1: Materials Science and Technologies

Analysis of Magnetron-Deposited Titanium Oxynitride Coatings by Scanning Electron Microscopy and Raman Scattering G.V. Arysheva, N.M. Ivanova, M.E. Konishchev, A.A. Pustovalova and V.S. Sypchenko	3
Behavior of TiO₂-B System under Mechanical Activation D.G. Demyanyuk, O.Y. Dolmatov, D.S. Isachenko, M.S. Kuznetsov, A.O. Semenov and S.S. Chursin	7
Changes in the Spectral Characteristics of Aluminum Films Deposited under Assisting Argon Ion Beam S.P. Umnov, O.K. Asainov, S.N. Popova and A.N. Lemachko	11
Eddy Current Method for Testing of Metals under Simultaneous Exposure to Radiation and Hydrogenation V.V. Larionov, A.M. Lider and Y.S. Bordulev	16
Effect of Hydrogen on Conductivity of Metals V.V. Larionov, S.P. Xu, K. Shi and M.X. Kroning	21
Formation of Shear Zone's Defect Structure in F.C.C. Metals V.A. Starenchenko, D.N. Cherepanov, O.V. Selivanikova and E.A. Barbakova	26
Influence of Carbon Pulse Ion Beam on Titanium Alloy P.A. Beloglazova, I.P. Chernov, Y.P. Cherdantsev and N. Pushilina	30
Investigation of Multilayered Film Structure Properties for Creation of Hydrogen Selective Membrane A. Ryabchikov, V. Golovkov, D. Sivin and V. Sokhoreva	34
Investigation of ZrO₂ and TiO₂ Coatings Influence on Hydrogen Sorption Behavior by Zirconium Alloy Zr1%Nb at Saturation from Gas Atmosphere I.P. Chernov, N.S. Pushilina, V.N. Kudiiarov, E.V. Berezneeva, A.N. Nikolaeva and O.V. Krysina	38
Laws of Radiation Grafting of Styrene to PVDF Films and Characterization of the Grafted Polymer V. Sokhoreva, V. Golovkov, N. Dubrova and D. Sidko	42
Methods of Uranium Hexafluoride Purification A.A. Orlov and R.V. Malyugin	46
Obtaining Hydrogen and Carbon Materials from Hydrocarbonic Gas in Microwave Plasma Discharge at Atmospheric Pressure A.G. Zherlitsyn, V.P. Shiyan and N.N. Zyablova	50
Study on the Spatial Structure of Ultrafine-Grained Light Alloys by Microtomography A. Batranin, V.A. Skripnyak, V.V. Skripnyak, S. Chakhlov, S. Stuchebrov and K. Keltsiyeva	54
Technology of Synthesis of Opal Matrix Metamaterials A. Bagdasarian, M. Samoylovich, A. Mkrтчyan, A. Rinkevich, A. Belyanin, S. Bagdasarian, A. Mkrтчyan and A. Afanasieva	58
Temperature Effect on the Rate of Hydrogen Desorption by Carbon Materials L.V. Gulidova, N.A. Dubrova and A.M. Lider	61
UHF-Properties of Nanocomposites: Magnetic Resonance A. Bagdasarian, M. Samoylovich, A. Mkrтчyan, A. Rinkevich, A. Belyanin, S. Bagdasarian, A. Mkrтчyan and N. Vasilevskaya	66
Simulation of the Uranium Crystallization Process Using Cellular Automata A.O. Ochoa Bique and A.G. Goryunov	72
Development of a Thermal Model of the Experimental Electrolyzer E.M. Gladyr, A.A. Denisevich and N.V. Demyanenko	77
Fluoride Technology of Processing Oxides of Rare Earth Elements A.Y. Swarovski, A.I. Soloviev, A.L. Kalashnikov, V.M. Malyutina, A.S. Sitnikov, O.L. Vasilyeva and S.V. Shalyapin	82

Chapter 2: Plasma, Microwave, Ion, Electron and Isotope Technologies

Development of Impurities Determination Method in Isotopically Enriched Preparations A.I. Skorikov, V.G. Baskov, A.V. Kidyamkin, U.M. Marochkina and E.E. Popovtsev	89
Carbon and Oxygen Atoms Distribution along Low-Temperature Plasma Torch in the Magnetic Field V.F. Myshkin, D.A. Izhoikin, E.V. Bospala and I.A. Ushakov	93
Cluster Structure of Salt Solutions in Polar Dielectric Liquids I. Shamanin, M. Kazaryan and D. Sidko	97
Control over Hard X-Ray Parameters Using External Temperature Gradient V. Kocharian, A. Mkrtychyan, A. Gogolev, S. Khlopuzyan and P. Grigoryan	107
Determination of Optimal Parameters of the X-Ray Source on the Basis of Compact Electron Accelerators Y. Cherepennikov, A. Gogolev, A. Wagner and A. Yuzhakov	111
Diffusion of Hydrogen in Steel by Electron Irradiation V.V. Larionov, Y.I. Tyurin, N.N. Nikitenkov and A.S. Dolgov	115
Dosimetry Equipment for the Pulsed X-Ray Source Parameters Investigation I. Miloichikova, S. Stuchebrov, G. Zhaksybayeva and A. Wagner	121
Excitation of Electromagnetic Waves in a Vircator by Radially Diverging Beam V.P. Grigoriev, T.V. Koval, A.G. Zherlitsyn, V. Verkhoturova and G.G. Kanaev	125
Features of the Distribution Process of the Electromagnetic Field Frequency Components in the High-Frequency Torch Discharge Plasma Y. Lutsenko, I. Miskun and E. Zelenetskaya	129
First Principle Calculations of Diffusion Barriers for Hydrogen in α-Zirconium L.A. Svyatkin, Y.M. Koroteev and I.P. Chernov	133
Form-Factors of Relativistic Electron Bunches in Polarization Radiation G.A. Naumenko	138
Manifestation of the Spin in the Isotope Effects V.G. Plekhanov, V.F. Myshkin, V.A. Khan and D.A. Izhoikin	147
Nonlinear Electrodynamics Effects of the Torch Discharge Argon Plasma Y. Lutsenko, I. Miskun and E. Zelenetskaya	152
Plasma Module Based on High Frequency Torch Plasmatron for the Research of the Processes of Plasma Utilization and Immobilization of Closed NFC Wastes A.G. Karengin, A.A. Karengin, I.Y. Novoselov and N.V. Tundeshev	158
Portable Gamma-Ray Spectrometer for High Intensity Beam Measuring A. Vukolov, A. Gogolev, Y. Cherepennikov, A. Ogrebo and A. Egioya	162
Spontaneous Radiation and Quantum Dynamics of Biological Plasma V. Lasukov, T. Lasukova, V. Novoselov and E. Moldovanova	168
Calculation and Optimization of Plasma Processes of Utilization and Immobilization of Silts in Low Radioactive LRW Storage Pools A. Karengin, A. Karengin, I. Novoselov and N. Tundeshev	173
Calculation and Optimization of Plasma-Based Utilization Process of Inflammable Wastes after Reprocessing of Spent Nuclear Fuel of Closed Nuclear Cycle A. Karengin, A. Karengin, I. Novoselov and N. Tundeshev	178
Determination of Characteristics of the Torch Discharge Plasma Burning in a Mixture of Atomic and Molecular Gases Y. Lutsenko and I. Miskun	183
Features of the Evolution of $^4\text{He}^+$ Ion Flux in Yttrium Iron Garnet in the Channeling Mode V.M. Malyutin, D.A. Karpov and Y.Y. Kryuchkov	187
Laser Activation of Isotope Selective Processes in a Magnetic Field V.F. Myshkin, V.G. Plekhanov, E.V. Bospala, V.A. Khan, I.A. Ushakov and E.A. Baranov	191
Low Pressure Discharge Characteristics in a Large Sized Hollow Cathode T.V. Koval, I.V. Lopatin, B.H. Nguen and A.S. Ogorodnikov	196
The Possibility of Quasi-Bound State Formation of η-Meson with Helium Isotopes V.A. Tryasuchev and A.V. Isaev	200
Coherent Radiation of Relativistic Electrons in Dielectric Fibers G.A. Naumenko, V.V. Bleko and V.V. Soboleva	205

Coherent Transition Radiation from Wire Metamaterials G.A. Naumenko, V.V. Bleko, V.V. Soboleva and A.O. Shumeyko	213
Coherent X-Rays Generated by Relativistic Electrons in a Tungsten Monocrystal Y. Adishev, V. Zabaev, V. Kaplin, S. Kuznetsov, S. Uglov and V. Ivanov	217
Development of New Ion and Plasma Surface Modification Methods A. Ryabchikov, D. Sivin and I. Stepanov	221
Generation of Mechanical Waves in Metals under the High Power Ion Beam Irradiation V.I. Boyko, Y.V. Daneykin, V.I. Lisov and E.Y. Pimenov	225
Features of Edge Effect of Coherent Synchrotron Radiation of Relativistic Electrons G.A. Naumenko, V.V. Bleko and V.V. Soboleva	234
Features of Valence Electron Density Distribution in Zr–H and Zr–He O.V. Lopatina, L.A. Svyatkin, Y.M. Koroteev and I.P. Chernov	241
Polarization Bremsstrahlung by Relativistic Electrons in Backscattering Geometry for Diagnosing Atomic Structure of Polycrystals V.I. Alekseev, A.N. Eliseev, E.F. Irribarra, I.A. Kishin, A.S. Kubankin, V.S. Levina, I.S. Nikulin, R.M. Nazhmudinov and V.I. Sergienko	246
Monochromatic X-Ray Source for Dual-Wave X-Ray Absorptiometry A. Gogolev, Y. Cherepennikov, R. Rezaev and A. OGREBO	252
Formation of Pulses with Adjustable Parameters in a Resonant Microwave Pulse Compressor A.S. Shlapakovski, S.N. Artemenko, P.Y. Chumerin and Y.G. Yushkov	256
High Power Microwave Compressor with Two Output Units for Synchronous Energy Extraction V.A. Avgustinovich, S.N. Artemenko, S.A. Gorev, V.S. Igumnov, V.L. Kaminsky, S.A. Novikov and Y.G. Yushkov	262
Superconducting Cavities in Systems of the Resonant Microwave Pulse Compression S.N. Artemenko, V.L. Kaminsky, G.M. Samoylenko and B.A. Alekseev	266

Chapter 3: Nuclear Engineering and Fuel Cycles

Advantages of Thorium Nuclear Fuel for Thermal-Neutron Reactors I. Shamanin, S. Bedenko and I. Gubaydulin	275
Angular Distributions of EUV Generated by Electrons with 5.7 MeV Energy in a Multilayer Mo/Si Structure S.R. Uglov, L.G. Sukhikh, A.V. Vukolov and I.R. Fateev	280
Conceptual Approach to Handling Irradiated Nuclear Fuel in Storage Systems I. Shamanin, S. Bedenko, I. Gubaydulin, N. Novikova and M. Plevaka	285
Degradation of Beryllium Reflector Properties on the IRT-T Reactor A. Naymushin, Y. Chertkov, V. Varlachev, M. Anikin, A. Chyuykina and Y. Ermakova	289
Determining Reactor Graphite Lifespan from Thermal Properties Degradation D. Baybakov, A. Naymushin, V. Nesterov, S. Savanuk and I. Shamanin	294
Facilities for Neutron Capture Therapy at IRT MEFHI Nuclear Reactor I.N. Sheino, V.F. Khokhlov, P.V. Izhevskiy, V.K. Sakharov, A.A. Portnov and A.A. Wagner	298
Feasibility Study of Using New Fuel Composition in IRT-T Research Reactor A.G. Naymushin, Y.B. Chertkov, V.V. Kurganov, I.I. Lebedev, S.A. Mongush and N.V. Daneikina	306
Formation of the Irradiation Zone for Neutron Transmutation Doping Using the Pool-Type Research Reactor V.A. Varlachev, A.V. Golovatsky, E.G. Emets and Y.A. Butko	309
Influence of the Graphite's Lifespan on the Design Value of Fuel Burnup in High Temperature Gas-Cooled Reactors D.F. Baybakov, A.V. Golovatsky, A.G. Naymushin, V.N. Nesterov, S.N. Savanyuk and I.V. Shamanin	313
Preparation of ¹⁸⁸W from Unenriched Targets in Middle Flux Nuclear Reactors A.O. Pavluk, E.V. Chibisov, D.V. Kabanov, V.V. Zukau and V.G. Merkulov	317
Reactor Model for Plasma Utilization of Dispersed Water-Organic Compositions Based on a Closed Nuclear Fuel Cycle Inflammable Wastes A.G. Karengin, A.A. Karengin, I.Y. Novoselov and N.V. Tundeshev	322

Research of Possibility of Sludge Complex Recycling in Low Radioactive LRW Storage Pools	
A.G. Karengin, N.V. Tundeshev, I.Y. Novoselov and E.A. Oreshkin	327
Technology for Silicon NTD Using Pool-Type Research Reactors	
V.A. Varlachev, E.G. Emets and Y.A. Butko	333
Way to Obtain Uranium Hexafluoride	
A.A. Orlov and R.V. Malyugin	338
X-Ray Absorption Coefficient Behavior Depending on Disposition of Diffraction Vector and Temperature Gradient Vector	
K. Hayrapetyan, S. Noreyan, V. Margaryan and V. Kocharyan	342
 Chapter 4: Radiation Technologies in Medicine	
Application of Digital Auskultometer in Radiotherapy	
A.N. Aleinik, R.K. Kusainov and N.D. Turgunova	349
Application of NANOCOLLOID MATERIALS LABELED BY RADIONUCLIDES IN MEDICINE	
V.S. Skuridin, E.S. Stasyuk, A.S. Rogov, V.L. Sadkin, N.V. Varlamova and E.A. Nesterov	352
Biological Dosimetry of the Irradiation Emitted by NG-12I Neutron Generator	
E. Kandakova, A. Vazhenin, S. Kiryushkin, E. Pryakhin and A. Akleev	357
Breast Scintigraphy with ¹⁹⁹Tl in Diagnosis of Breast Cancer	
A. Titskaya, V. Chernov, E. Slonimskaya, I. Sinilkin and R. Zelchan	361
Combined Modality Treatment Including Neutron Therapy for Tumors of the Nasal Cavity and Paranasal Sinuses	
V. Novikov, L. Musabaeva and O. Gribova	365
Development of the Binary Technologies for Radiation Therapy of Malignant Tumors – Current State and Problems	
I.N. Sheino, V.F. Khokhlov and P.V. Izhevskiy	369
Diagnostic Efficiency of Single-Photon Emission Computed Tomography with ^{99m}Tc-MIBI in Visualization of Malignant Tumors of the Larynx and Laryngopharynx	
R. Zelchan, V. Chernov, A. Titskaya, I. Sinilkin, S. Chizhevskaya and Y.T. Choyzonov	373
Dynamic Renoscintigraphy with ^{99m}Tc-DTPA in the Evaluation of Renal Function in Patients with Chronic Heart Failure	
Z.V. Vesnina and Y.B. Lishmanov	377
Electroporation Application as an Alternative to Radiation Therapy	
A.N. Aleinik, M.R. Muhamedov, N.D. Turgunova, R.G. Babaev and N.I. Karpovich	381
Evaluation of Functional Factors and Life Quality of Patients with Parotid Gland Cancer after Multimodal Treatment Including Radiation Therapy	
E.L. Choyzonov, M.V. Avdeenko, L.N. Balatskaya and V.V. Verkhoturova	384
Experimental Investigation of ^{99m}Tc-Nanotech Used for Lymph Nodes Visualization	
I. Sinilkin, V. Chernov, A. Titskaya, R. Zelchan and N. Daneikina	389
Immediate and late Clinical Outcomes in Patients with Head and Neck Cancer Treated at the Ural Neutron Center	
A. Kuznetsova, A. Vazhenin, O. Golykov, E. Kandakova, Z. Munasipov, I. Vazhenin and G. Bobkova	393
Methods of Synthesis of Radiopharmaceuticals Based on Fatty Acids Marked with ^{99m}Tc and Perspectives of their Application	
M.L. Belyanin, E.V. Stepanova, S.M. Minin, Y.B. Lyshmanov and V.D. Filimonov	400
Multimodality Treatment of Locally-Advanced Breast Cancer Using 6.3 MeV Fast Neutrons and Quality of Life in Patients in Long-Term Follow-Up	
Z. Startseva, L. Musabaeva and V. Lisin	406
Neutron and Neutron-Photon Therapy for Head and Neck Cancer	
O. Gribova, L. Musabaeva, E. Choyzonov and V. Novikov	409
Non-Invasive Tissue Injury Monitoring Using Bioimpedance Spectroscopy	
A.N. Aleinik, N.D. Turgunova, V.V. Velikaya, L.I. Musabaeva, Z.A. Startseva and M.R. Mukhamedov	413
Possibilities of Cardiac Scintigraphy with ¹²³I-Iodophen in Patients with Various Forms of Cardiomyopathies	
Y.B. Lishmanov, S.M. Minin, Y.V. Saushkina and M.O. Gulya	417

Possibilities of Radionuclide-Tomo-Ventriculography with Labeled ^{99m}Tc Technetium of Sodium Diphosphate Decahydrate in Assessing Mechanical Dyssynchrony of Myocardium and Intracardiac Hemodynamics in Ventricular Arrhythmias in Children	
K.V. Zavadovskij, V.V. Saushkin and Y.B. Lishmanov	422
Possibility for Application of ^{99m}Tc-Methoxyisobutylisonitrile in Assessing the Efficiency of Chemotherapy Cardiotoxicity Prevention	
V. Chernov, T. Kravchuk, R. Zelchan, D. Podoplekin and V. Goldberg	426
Possibility of Using ^{99m}Tc-Labeled Macro-Aggregates of Serum Albumin and Diethylene Triamine Pentaacetic Acid in the Assessment Lung Ventilation and Perfusion in Patients with Chronic Obstructive Pulmonary Disease and Coronary Artery Disease	
N.G. Krivonogov, T.S. Ageeva, S.P. Mishustin, K.V. Zavadovsky, V.V. Saushkin and Y.B. Lishmanov	430
Possibility of Using Nuclear Track Membrane for Ophthalmology	
E. Bosykh, V. Pichugin and V. Sokhoreva	434
Possibility of Using ^{99m}Tc-HMPAO in Estimating Long-Term Prognosis of Cerebral Complications of Coronary Artery Bypass Graft	
Y.B. Lishmanov, N.Y. Efimova, V.I. Chernov, I.Y. Efimova and S.D. Akhmedov	438
Possibility to Use the Radiopharmaceutical Based on the Gamma-Aluminum Oxide Labeled with ^{99m}Tc to Identify Sentinel Lymph Nodes in the Experiment	
V. Chernov, A. Titskaya, I. Sinilkin, R. Zelchan and N. Varlamova	443
Prevention and Treatment of Local Breast Cancer Recurrence Using 6.3 MeV Fast Neutrons	
V. Velikaya, L. Musabaeva, V. Lisin and Z. Startseva	447
Production of Meta-Iodobenzilguanidine, ^{123}I Preparation for Medical Diagnostics	
I.E. Slamkulov, V.S. Skuridin, A.S. Semenov and A.A. Garapatsky	451
Radiocardiopulmonography with ^{99m}Tc-Pertechnetate in the Study of Pulmonary and Myocardial Hemodynamics in Patients with Chronic Heart Failure	
Z.V. Vesnina, N.G. Krivonogov and U.A. Smirnova	456
Radionuclide Diagnosis of Breast Cancers	
A. Titskaya, V. Chernov, E. Slonimskaya, I. Sinilkin and R. Zelchan	460
Reactor Neutrons in Multimodality Treatment of Locally Advanced Breast Carcinoma	
Y.S. Mardynsky, I.A. Gulidov, G.G. Aminov, Y.A. Ragulin, I.I. Kotuchov and K.B. Gordon	464
Response of Resistant Malignant Tumors to Neutron Therapy	
L.I. Musabaeva and V.A. Lisin	467
Single-Photon Emission Computed Tomography and ^{99m}Tc-Methoxy-Isobutyl-Isonitrile in the Detection and Forecast of Cardiotoxicity of Chemotherapeutic Agents	
V.I. Chernov, T.V. Kravchuk, R.V. Zelchan, D.M. Podoplekin and V.E. Goldberg	471
Single-Photon Emission Computed Tomography with ^{199}Tl in Diagnostics of Malignant Tumors of the Larynx and Laryngopharynx	
R. Zelchan, V. Chernov, A. Titskaya, I. Sinilkin, S. Chizhevskaya and E.T. Choyznov	476
SPECT with ^{99m}Tc-HMPAO and Cognitive Function in Patients with Arterial Hypertension: Impact of Antihypertensive Therapy	
I.Y. Efimova, N.Y. Efimova, S.V. Triss and N.N. Zyablova	479
Therapy of Malignant Tumor with 6.3 MeV Fast Neutrons	
L.I. Musabaeva and V.A. Lisin	483
Use of ^{99m}Tc-HMPAO in Estimating the Antihypertensive Therapy Impact on the Cerebral Perfusion in Patients with Arterial Hypertension Associated with Diabetes Mellitus Type 2	
I.Y. Efimova, N.V. Belokopytova, N.Y. Efimova and Y.B. Lishmanov	487
Use of ^{99m}Tc-HMPAO Brain SPECT in Patients with Arterial Hypertension: Correlation with Cognitive Function	
I.Y. Efimova, N.Y. Efimova, S.V. Triss and Y.B. Lishmanov	492
Use of ^{99m}Tc-HMPAO for Scintigraphic Evaluation of Cerebral Microcirculation in the Patients with Persistent Atrial Fibrillation	
N.Y. Efimova, V.I. Chernov, I.Y. Efimova and S.V. Popov	496
Use of ^{99m}Tc-HMPAO in Evaluating Cerebrovascular Events in the Patients with Metabolic Syndrome: Relationship to Cognitive Function	
N.Y. Efimova, V.I. Chernov, I.Y. Efimova and Y.B. Lishmanov	501
Use of ^{99m}Tc-HMPAO in Evaluating the Results of Cerebral Hypoperfusion Prevention in the Patients with Coronary Heart Disease after Coronary Artery Bypass Grafting	
N.Y. Efimova, V.I. Chernov, I.Y. Efimova, S.D. Akhmedov and Y.B. Lishmanov	506

Use of Autoleukocyte, Labelled with ^{99m}Tc-Exametazine for Evaluation of Inflammatory Changes in Myocardium	
S.I. Sazonova, Y.B. Lishmanov, Y.N. Ilyushenkova, R.E. Batalov and Y.V. Rogovskaya	511
Use of Pulse Oximetry in Radiotherapy	
N.I. Martemyanova, N.D. Turgunova and A.N. Aleinik	515
Use of Single Photon Emission Computed Tomography (SPECT) with ^{99m}Tc-MIBI for Evaluation of Neoadjuvant Chemotherapy Effectiveness of Larynx and Laryngopharynx Cancer Treatment	
R. Zelchan, V. Chernov, A. Titskaya, I. Sinilkin, S. Chizhevskaya and E.T. Choynzonov	519
Use of SPECT with ^{99m}Tc-Pyrophosphate Combined with a Perfusion Myocardium Scintigraphy in the Evaluation of Inflammatory Changes of the Heart in Patients with Persistent Atrial Fibrillation	
S.I. Sazonova, Y.B. Lishmanov, J.N. Ilyushenkova, R.E. Batalov and J.V. Rogovskaya	523
Use of Technetium-99m-Labeled Lipophilic Complex of Methoxy-Isobutyl-Isonitrile and Iopromide Radiopaque Substance to Assess the Severity of Coronary Atherosclerosis in Patients with Coronary Heart Disease at Mild Disorders of Myocardial Perfusion	
K.V. Zavadovsky, M.O. Gulya, Y.B. Lishmanov and V.V. Verkhoturova	527
Use of Technetium-99m-Labeled Methoxy-Isobutyl Isonitrile and Iodine 123-Labeled Phenyl-Methyl-Pentadecanoic Acid in the Diagnosis and Prognosis of Patients with Dilated Cardiomyopathy	
Y.B. Lishmanov, K.V. Zavadovsky, M.O. Gulya, S.M. Minin and D.I. Lebedev	532
Use of Technetium-99m-Labelled Sodium Diphosphate Decahydrate to Assess Right Ventricle Dysfunction in Patients with Pulmonary Embolism	
K.V. Zavadovsky, N.G. Krivonogov and Y.B. Lishmanov	536
Using Nanotech Radiopharmaceutical for the Visualization of Sentinel Lymph Nodes in Patients with Cervical Cancer	
I. Sinilkin, V. Chernov, A. Chernishova, L. Kolomiets, A. Titskaya and R. Zelchan	540
Using Nanotech Radiopharmaceutical for the Visualization of Sentinel Lymph Nodes in Patients with Larynx and Hypopharynx Cancer	
I. Sinilkin, V. Chernov, E.T. Choynzonov, S. Chijevskaya, A. Titskaya and R. Zelchan	545
Development of Magnetic-Resonance Contrast Composition Based on Disodium Salt of Gd-DTPA	
V.S. Skuridin, E.S. Stasyuk and V.I. Chernov	549
New Porphyrins/Calf Thymus DNA Complexes - Their Thermostability	
L. Aloyan, Y. Dalyan and A. Gogolev	554
Potential for Therapeutic Gain - 29 MeV Neutrons versus 6 MeV Neutrons	
J. Slabbert and A. Vral	559
Obtaining Technetium-99m-Labeled Glucose Derivatives	
V.S. Skuridin, E.S. Stasyuk, E.A. Ilyina and A.S. Rogov	567
Polimer Gafchromic EBT3 Films in Clinical Dosimetry	
E. Sukhikh, L. Sukhikh and E. Malikov	572
Possibility of Nanocolloid Radiopharmaceutical Using for the Visualization of Sentinel Lymph Nodes in Patients with Gastric Cancer	
I. Sinilkin, V. Chernov, S. Afanas'ev, A. Titskaya and R. Zelchan	577
Preparation Technique of Technetium-99m-Labeled Nanoparticles of Fe@C with Modified Surface	
V.S. Skuridin, E.S. Stasyuk, A.S. Rogov, N.V. Varlamova, E.A. Nesterov, V.L. Sadkin and P.S. Postnikov	582
Stimulation of Bone Tissue Reparative Regeneration by Implants with Bioactive Coating for Diaphyseal Fractures	
A.V. Popkov, D.A. Popkov, N.A. Kononovich, E.N. Gorbach and S.I. Tverdokhlebov	587
Thermal Desorption of Iodine-123 from Tellurium-122 Oxide Irradiated by Deuterons	
V. Skuridin, A. Garapatski, I. Slamkulov, A. Semenov and Y. Ermakova	593
Dose Rate Spatial Distribution Produced by the Pulsed X-Ray Source in the Radiographic Examination	
I. Miloichikova, S. Stuchebrov, A. Krasnykh and A. Wagner	598
Application of Cold Atmospheric Pressure Plasmas for Biological Tissue Treatment	
A.N. Aleinik, A.N. Baykov, G.T. Dambaev and E.V. Semichev	602

Chapter 5: Computation, Automation, Information Technologies and Safety Systems in Nuclear Industry

Analysis of Interaction Peculiarities in the System “OUTSIDER – PHYSICAL PROTECTION SYSTEM” for Nuclear Facility A. Godovykh, M. Parepko and B. Stepanov	609
Application of Void-Free Filling Technology for Additional Safety Barriers Creation during Uranium-Graphite Reactors Decommissioning A. Izmetiev, A. Pavliuk and S. Kotlyarevsky	613
Approaches to Modeling UF₆ Desublimation Process A.A. Orlov and R.V. Malyugin	620
Assessing the Feasibility of Complex Recycling of SNF Reprocessing Waste Using RF Torch Air Plasma A.G. Karengin, I.Y. Novoselov and N.V. Tundeshev	625
Capacity Pump Control by Dual-Channel Adaptive System with Throttle and Frequency Control A.G. Goryunov, K.A. Ivanov and I.S. Nadezhdin	630
Closed Loop Identification by Optimization Method V.F. Dyadik, N.S. Krinitsyn and V.A. Rudnev	636
Computer Simulator of Separation Production A.A. Orlov, S.N. Timchenko and V.S. Sidorenko	642
Control Model of the Synthesis of Binary Systems under Loading Reactive Additives into the Mixture D.G. Demyanyuk, O.Y. Dolmatov, D.S. Isachenko, M.S. Kuznetsov, A.O. Semenov and S.S. Chursin	647
Development and Creation of Software and Information Environment for Simulation of Nuclear Facility A. Godovykh and B. Stepanov	652
Harmonization Values of Downloads and Operating Modes of Interconnected Devices Production of Uranium Hexafluoride I.S. Nadezhdin and N.S. Krinitsyn	655
Hybrid Automatic Control System of the Cascade of Centrifugal Extractors E.P. Zelenetskaya and A.G. Goryunov	661
Mathematic Simulation of Crystallization Refining Process of Spent Nuclear Fuel Reprocessing Desired Products in Linear Crystallizer S. Veselov, V. Volk, V. Kasheev, T. Podimova and E. Posenitskiy	666
Mathematical Model of Non-Stationary Hydraulic Processes Occurring in Gas Centrifuges for Uranium Enrichment A.A. Orlov, S.N. Timchenko and V.S. Sidorenko	673
Mathematical Model of Pressure and Flow Distribution on Fluorine Production Lines O.P. Savitsky, V.F. Dyadik and O.P. Kabrysheva	678
Mean-Square Convergence of Recursive Kernel Estimators of Non-Homogeneous Poisson Process Intensity Function and its Derivative A.V. Kitaeva and M.V. Kolupaev	684
Model of Emergency Shutdown System of TOKAMAK KTM P. Pokrovsky and V. Kudryavtsev	689
Performance Evaluation of Micro-CT Scanners as Visualization Systems A. Batranin, D. Ivashkov and S. Stuchebrov	694
Radiation Burden Decline to the Objects in the X-Ray Investigation S. Stuchebrov, A. Batranin, A. Krasnykh, I. Miloichikova and A. Wagner	698
Radiation Portal Monitors: Problems and Development Prospects A.V. Dudkin	702
Spatial Distribution of Potential Created by an External Perturbation in Pd and PdH V.M. Silkin, V.U. Nazarov and I.P. Chernov	708
The Intensity of Ion Formation in Soil within the 30-Kilometer Zone of Fukushima Daiichi Nuclear Power Plant G.A. Kolotkov	713

Validation and Uncertainty Analysis of the Thermal Hydraulics Module of SOCRAT-BN Code on the Rod Bundle Experiment Y. Vinogradova, N. Ryzhov and R. Chalyy	717
Biindication of the Area of Heavy Metal Deposition for Point Sources of Pollution N.K. Ryzhakova, A.L. Borisenko, E.A. Pokrovskaya, D.V. Kabanov and V.O. Babicheva	722
Control Model of SH-Synthesis for Two-Component Systems D.G. Demyanyuk, O.Y. Dolmatov, D.S. Isachenko, M.S. Kuznetsov, A.O. Semenov and S.S. Chursin	728