

Table of Contents

Preface

Committees

SECTION I – SOFT SOLUTION PROCESSING

Spray Freeze Granulation of Nano Powders for Die Pressing J. Binner, K. Annapoorani and B. Vaidhyanathan	1
New Synthesis Process of Li, Na and K Niobates from Metal Alkoxides Y. Suyama, T. Yamada, Y. Hirano, K. Takamura and K. Takahashi	7
Novel Sol-Gel Synthesis of LiMn_2O_4 and $\text{LiNi}_x\text{Co}_{1-x}\text{O}_2$ Powders A. Deptula, W. Łada, T. Olczak, D. Wawszczak, M. Brykala, F. Zaza and K.C. Goretta	14
Synthesis of Alumina and Aluminum Nitride Layers on a Graphitic Substrate via a Sol-Gel Route F. Fontaine, R. Pailler and A. Guette	24
Synthesis of Monodispersed Plate-Like CeO_2 Particles by Precipitation Process in Sodium Hydrogen Carbonate Solution S. Yin, Y. Minamidate and T. Sato	30
Co-Doping Effect of Metal Ion on the Visible Light Responsive Photocatalytic Properties of Nitrogen Doped Titanium Dioxide P.L. Zhang, S. Yin and T. Sato	36
Tailored Silica Based Xerogels and Aerogels for Insulation in Space Environments L. Durães, M. Ochoa, A. Portugal, N. Duarte, J.P. Dias, N. Rocha and J. Hernandez	41
<i>In Situ</i> TEM Observation of Crystallization Process for LiNbO_3 and NaNbO_3 H. Nakano and Y. Suyama	47
Microwave Assisted Solvothermal Synthesis and Visible Light Photocatalytic Properties of Nb and N Co-Doped SrTiO_3 Nanoparticles U. Sulaeman, S. Yin and T. Sato	52

SECTION II – SPARK PLASMA AND MICROWAVE SYNTHESIS AND SINTERING

Numerical Simulation of Spark Plasma Sintering C. Garcia and E. Olevsky	58
Densification Mechanism of MgAl_2O_4 Spinel during Spark-Plasma-Sintering K. Morita, B.N. Kim, H. Yoshida, K. Hiraga and Y. Sakka	62
Production and Characterization of Boron Carbide – Titanium Diboride Ceramics by Spark Plasma Sintering Method B. Uygun, G. Göller, Y. Onüralp and F.Ç. Şahin	68
The Effects of Codoping Y_2O_3 on MgO Doped Spark Plasma Sintered Al_2O_3 B. Apak, G. Göller, Y. Onüralp and F.Ç. Şahin	74
Spark Plasma Sintering of Boron Carbide and Effects of Various Additives on Sintering and Material Properties Y. Çelik, G. Göller, Y. Onüralp and F.Ç. Şahin	79
Microwave Absorbency Change of Zirconia Powder and Fiber during Vacuum Heating S. Sano, S. Kawakami, Y. Takao, S. Takayama and M. Sato	85
Microwave Assisted Reaction Sintering of $\text{ZrSiO}_4/\alpha\text{-Al}_2\text{O}_3$ Mixtures O. Ertugrul, S. Akpınar, I.M. Kusoglu and K. Onel	91

SECTION III – HYBRID MATERIALS

Hybrid Foams, Colloids and Beyond: Advanced Ceramics through Integrative Chemistry N. Brun, S. Ungureanu, F. Carn, B. Julián-López and R. Backov	97
Panosopic Assembling of Ceramic Materials for High Performance UV-Ray Shielding Application T. Sato, X.W. Liu and S. Yin	107

Lightweight Hybrid Foam with Dimensional Stability M.Y. Chen and C.G. Chen	114
Ceramic/Polymeric Hybrids with Reduced Coefficients of Thermal Expansion C.G. Chen, K.H. Hoos and M.Y. Chen	120
Dimension- and Direction-Controlled Gold Nanorods Deposited in Ordered Mesoporous Silica G. Kawamura, I. Hayashi, R.A. Fitrah, H. Muto, J. Hamagami and A. Matsuda	126

SECTION IV – POROUS CERAMICS

Heterogeneous Sol-Gel Systems – Derived Ceramics O.A. Shilova	131
Smart Processing for Ceramics Structure Tectonics: Fabrication of Dielectric Micro Patterns for Artificial Photosynthesis in Terahertz Wave Regions by Using Stereolithography S. Kirihaara, N. Komori and N. Ohta	141
Clay Aerogel Composite Materials D.A. Schiraldi, M.D. Gawryla and S. Alhassan	147
Synthesis and Characterization of Mesoporous Hydroxyapatite K.S. Lew, R. Othman and F.Y. Yeoh	152
New Methodology in Modeling Ceramics M.A. Algatti, E. Ferreira de Lucena, É. de Campos, R.P. Mota and J.G.A. Santana	158
Influence of Binder on Porous Ceramic Properties Prepared by Polymeric Sponge Method K. Jach, K. Pietrzak, D. Kalinski and M. Chmielewski	164
Fabrication of Porous Silicon Nitride by Sacrificing Template Method R.M. Mesquita and A.H.A. Bressiani	170
Aluminum Oxide Ceramics Obtained by Commercial Starch Consolidation with Gradient Porosity R.P. Mota, R. Sampaio Fernandes, É. de Campos, E. Ferreira de Lucena and M.A. Algatti	175
Processing of Municipal Solid Waste (MSW) Fly Ash into an Environmentally Stable and Safe Material M. Isac, Z. Ghoulleh and R.I.L. Guthrie	181

SECTION V – SHS CERAMICS

V-1 Fundamentals and New Methods for SHS

Solution Combustion as a Promising Method for the Synthesis of Nanomaterials A.S. Mukasyan	187
Microwave Activated Combustion Synthesis and Compaction in Separate E and H Fields: Numerical Simulation and Experimental Results R. Rosa, P. Veronesi, C. Leonelli, A. Bonamartini Corradi, M. Ferraris, V. Casalegno, M. Salvo and S.H. Han	197
Use of Electrothermal Explosion and Electro-Thermal Analyser (ETA-100) for the Study the Kinetics of Fast High-Temperature Reactions in SHS-Ceramic Systems A.S. Shteinberg and A.A. Berlin	203
Simulation of Gasless Combustion of Mechanically Activated Solid Powder Mixtures S. Rashkovskiy	213
Macrokinetics for Macrostructure Forming of a Product in Self-Propagating High-Temperature Synthesis V. Prokofiev and V. Smolyakov	222

V-2 SHS of Ceramic Powders

Past and Current Accomplishments in Production of Ceramic Powders and Structures by Self-Propagating High-Temperature Synthesis Method J.A. Puszynski and A. Degraw	228
Carbon Combustion Synthesis of Ceramic Oxide Nanopowders K.S. Martirosyan	236

Double SHS of W_2B_5 Powder from $CaWO_4$ and B_2O_3 S. Yazici and B. Derin	246
Production of Zirconium Diboride Powder by Self Propagating High Temperature Synthesis B. Akkas, M. Alkan, B. Derin and Y. Onüralp	251
Utilization of NbC Nanoparticles Obtained by Reactive Milling in Production of Alumina Niobium Carbide Nanocomposites V. Trombini, A.H.A. Bressiani, E.M.d.J. Agnolon Pallone and R. Tomasi	257
V-3 Fabrication of SHS Products and Application Issues	
Composites Produced by SHS Method – Current Development and Future Trends J. Lis, D. Kata, M.M. Bučko, L. Chlubny and D. Zientara	263
Self-Propagating High-Temperature Synthesis of Iron- and Copper-Matrix Cermets A. Chrysanthou	273
Sintering and Hot-Pressing of Ti_2AlC Obtained by SHS Process L. Chlubny, J. Lis and M.M. Bučko	282
Catalytic Properties of the SHS Products - Review G. Xanthopoulou	287
Porous SHS-Ceramics Y.M. Maksimov, A.I. Kirdyashkin, V.K. Baev and A.N. Gushin	297
Mass-Forced SHS Technology of Ceramic Materials O. Odawara	302
SHS Refractory Materials “Furnon” and their Practical Implementations in Kazakhstan and Russia Z.A. Mansurov	312

SECTION VI – LAYERED AND FUNCTIONALLY GRADED MATERIALS

The Potential of Spark Plasma Sintering (SPS) Method for the Fabrication on an Industrial Scale of Functionally Graded Materials M. Tokita	322
Comparison of Microwave and Conventional Sintering of LHA Ceramics and Functionally Graded Alumina-LHA Ceramics Z. Negahdari and M. Willert-Porada	332
Fabrication of Functionally Graded ZTA Ceramics Using a Novel Combination of Freeze Casting and Electrophoretic Deposition A. Preiss, B. Su, S. Collins and P. Ellison	340
Effects of Strain-Graded Plastic Deformation on Mechanical Properties of Metals K. Matsuura and M. Ohno	348
Defect Crystal Structure of Low Temperature Modifications of Li_2MO_3 (M=Ti, Sn) and Related Hydroxides N.V. Tarakina, T.A. Denisova, Y.V. Baklanova, L.G. Maksimova, V.G. Zubkov and R.B. Neder	352
Atomic and Electronic Structure of Zinc and Copper Pyrovanadates with Negative Thermal Expansion T. Krasnenko, N. Medvedeva and V.G. Bamburov	358
Layered Alumina Ceramics with Porosity Steps E. Gregorová, W. Pabst and M. Chmelíčková	364
Fabrication of Porous Intermetallic Thick Films by Metallic Powder-Liquid Reaction T. Ohmi and M. Iguchi	370
High-Strength Reaction-Sintered Silicon Carbide for Large-Scale Mirrors - Effect of Surface Oxide Layer on Bending Strength S. Suyama and Y. Itoh	374
Development of Functionally Graded Coating Based Plasma Facing Materials for Fusion Reactor C.C. Ge, S.Q. Guo, Y.B. Feng, Z.J. Zhou, J. Du, H.B. Zhou and C. Wang	383
Relationship Between Microstructure and Hardness of ZrN/TiN Multi-Layers with Various Bilayer Thicknesses Y. Aoi, S. Furuhashi and H. Nakano	392

SECTION VII – OTHER PROCESSING ROUTES

Mechanical Properties of Si₃N₄-SiC Composites Sintered by HPHT Method P. Klimczyk	396
Effect of the Hydrothermal Heat Treatment Conditions of Titanium Substrates on the Bio-Mimetically Grown “Bone-Like” Apatite Coatings D. Teker, C.P. Sağ, M. Dinçer, S. Alkoy and K. Öztürk	402
Highly Porous Hydroxyapatite Ceramics for Engineering Applicatios H. Ivankovic, S. Orlic, D. Kranzelic and E. Tkalcec	408
Lithium Disilicate Glass-Ceramic Obtained from Rice Husk-Based Silica F.A. Santos, C. dos Santos, D. Rodrigues Júnior, D.R.R. Lazar, D. Faviero de Castro, D.G. Pinatti and R.A. Conte	414
Reactive Milling and Mechanical Alloying in Electroceramics R. Rivas-Marquez, C. Gómez-Yáñez, I. Velasco-Davalos and J. Cruz-Rivera	420
Crystal Growth of Calcite Nano-Plate by Alternate Soaking Method, Using CDS Crystals K. Hayashi, M. Tomohara, K. Fujino, G. Sakane and Y. Katayama	425