
Contents

Preface	xi
Acknowledgements	xiii
APPLICATION OF SINTERING IN EMERGING ENERGY APPLICATIONS: FUEL CELLS, SOLAR CELLS, HYDROGEN STORAGE	
Sintering Behavior of $Ce_{0.9}Gd_{0.1}O_{1.95-\delta}$ in Reducing Atmosphere A. Kaiser, J. W. Phair, S. Foghmoes, S. Ramousse, Z. He	3
Hydrogen Sorption Properties of Ti-Oxide/Chloride Catalyzed Na_2LiAlH_6 Enrique Martínez-Franco, Thomas Klassen, Martin Dornheim, Ruediger Bormann, and David Jaramillo-Vigueras	13
High Density Green Pellets of ZrN Fabricated by Particle Processing Thomas T. Meek, K. Gwathney, Chaitanya K. Narula, and L.R. Walker	21
EVOLUTION AND CONTROL OF MICROSTRUCTURE DURING SINTERING PROCESSES	
The Effect of Carbon Source on the Microstructure and the Mechanical Properties of Reaction Bonded Boron Carbide S. Hayun, H. Dilman, M. P. Dariel, N. Frage, and S. Dub	29
Modification of Mass Transport during Sintering Induced by Thermal Gradient Sébastien Saunier and François Valdivieso	41

FUNDAMENTAL ASPECTS OF SINTERING

Effects of Crystallization and Vitrification on Sintering Properties of Bentonite Clay 53
H. Camacho, C.A. Martínez, P.E. García, H.J. Ochoa, J.T. Elizalde, A. García, A. Aguilar, M. Bocanegra, and C. Domínguez

Dissolution of Alumina in Silicate Glasses and the Glass Formation Boundary 61
Keith J. DeCarlo, Thomas F. Lam, and William M. Carty

The Effect of Volume Fraction on Grain Growth during Liquid Phase Sintering of Tungsten Heavy Alloys 71
John L. Johnson, Louis G. Campbell, Seong Jin Park, and Randall M. German

IN-SITU MEASUREMENTS IN SINTERING

In-Situ Investigation of the Cooperative Material Transport during the Early Stage of Sintering by Synchrotron X-Ray Computed Tomography 85
R. Grupp, M. Nöthe, B. Kieback, and J. Banhart

Geopolymers Sintering by Optical Dilatometry 91
Elie Kamseu, Cristina Leonelli, and Dan S. Perera

MODELING OF SINTERING AT MULTIPLE SCALES

Meso-Scale Monte Carlo Sintering Simulation with Anisotropic Grain Growth 103
Gordon Brown, Richard Levine, Veena Tikare, and Eugene Olevsky

Numerical Simulation of Densification and Shape Distortion of Porous Bodies in a Granular-Transmitting Medium 113
Junkun Ma and Eugene A. Olevsky

The Effect of a Substrate on the Microstructure of Particulate Films 125
C.L. Martin and R. K. Bordia

Modelling Constrained Sintering and Cracking 135
Ruoyu Huang and Jingzhe Pan

Atomistic Scale Study on Effect of Crystalline Misalignment on Densification during Sintering Nano Scale Tungsten Powder 149
Amitava Moitra, Sungho Kim, Seong-Gon Kim, Seong Jin Park, Randall German, and Mark F. Horstemeyer

Variations in Sintering Stress and Viscosity with Mixing Ratio of Metal/Ceramic Powders 161
Kazunari Shinagawa

NOVEL SINTERING PROCESSES: FIELD-ASSISTED SINTERING TECHNIQUES

- Finite Element Modelling of Microwave Sintering 173
D. Bouvard, S. Charmond, and C.P. Carry
- Direct and Hybrid Microwave Sintering of Yttria-Doped Zirconia in a Single-Mode Cavity 181
S. Charmond, C. P. Carry, and D. Bouvard
- The Influence of Minor Additives on Densification and Microstructure of Submicrometer Alumina Ceramics Prepared by SPS and HIP 193
Jaroslav Sedláček, Monika Michálková, Deniz Karaman, Dušan Galusek, and Michael Hoffmann
- The Electro-Discharge Compaction of Powder Tungsten Carbide–Cobalt–Diamond Composite Material 205
Evgeny G. Grigoryev and Alexander V. Rosliakov
- Microwave Sintering Explored by X-Ray Microtomography 211
Kotaro Ishizaki, Manjusha Battabyal, Yoko Yamada Pittini, Radu Nicula, and Sebastien Vaucher
- Pulse Plasma Sintering and Applications 219
Andrzej Michalski and Marcin Rosiński
- Influence of Electric Fields during the Field Assisted Sintering Technique (FAST) 227
Michaela Müller and Rolf Clasen
- Sintering of Combustion Synthesized TiB_2 - ZrO_2 Composite Powders in Conventional and Microwave Furnaces 237
Hayk Khachatryan, Alok Vats, Zachary Doorenbos, Suren Kharatyan, and Jan A. Puszynski
- Production and Characterization of WC-Co Cemented Carbides by Field Assisted Sintering 249
Rafet Emre Özüdođru, Filiz Çınar Şahin, and Onuralp Yucel
- Microwave Rapid Debinding and Sintering of MIM/CIM Parts 259
P. Veronesi, C. Leonelli, G. Poli, L. Denti, and A. Gatto

SINTERING OF BIOMATERIALS

- Analysis of Sintering of Titanium Porous Material Processed by the Space Holder Method 273
L. Reig, V. Amigó, D. Busquets, M.D. Salvador and J.A. Calero

Effect of Sintering Temperature and Time on Microstructure and Properties of Zirconia Toughened Alumina (ZTA) M. M. Hasan and F. Islam	283
Sintering Zirconia for Dental CAD/CAM Technology Kuljira Sujirote, Sukunthakan Ngernbamrung, Kannigar Dateraksa, Tossapol Chunkiri, Marut Wongcumchang, and Kriskrai Sitthiseripratip	291

SINTERING OF MULTI-MATERIAL AND MULTI-LAYERED SYSTEMS

Co-Sintering Behaviors of Oxide Based Bi-Materials Claude Carry, Emre Yalamaç, and Sedat Akkurt	307
Coupling between Sintering and Liquid Migration to Process Tungsten-Copper Functionally Graded Materials J.-J. Raharijaona, J.-M. Missiaen, and R. Mitteau	321
Laser Sintering of Nanosized Alumina Powder for Scratch Resistant Transparent Coatings Christoph Rivinius and Rolf Clasen	333
Optimization of Density, Microstructure and Interface Region in a Co-Sintered (Steel/Cemented Carbide) Bi-Layered Material A. Thomazic, C. Pascal, J.M. Chaix	343

SINTERING OF NANOSTRUCTURED MATERIALS

MoSi ₂ Formation Mechanisms during a Spark Plasma Synthesis from Mechanically Activated Powder Mixture F. Bernard, G. Cabouro, S. Le Gallet, S. Chevalier, E. Gaffet, and Yu Grin	357
Spark Plasma Sintering of Nanocrystalline WC-12Co Cermets Victoria Bonache, Maria Dolores Salvador, Vicente Amigo, David Busquets, and Alicia Castro	367
Si ₃ N ₄ /SiC Materials Based on Pre-ceramic Polymers and Ceramic Powder U. Degenhardt, G. Motz, W. Krenkel, F. Stegner, K. Berroth, W. Harrer, and R. Danzer	379
Grain Growth during Sintering of Nanosized Particles Z. Zak Fang, Hongtao Wang, Xu Wang, and Vineet Kumar	389
Atomic Investigation of Thermal Stability of Nanosized Ceria Particles on Metal Oxide Surfaces W. Jiang, M. Wong, A.R. Rammohan, Y. Jiang, and J.L. Williams	401
Two-Step Sintering of Molybdenum Nanopowder Min Suh Park, Tae Sun Jo, Se Hoon Kim, Dae-Gun Kim, and Young Do Kim	415

Standard and Two-Stage Sintering of a Submicrometer Alumina Powder: The Influence on the Sintering Trajectory M. Micháľková, K. Ghillányová, and D. Galusek	421
SAXS Investigation of the Sintered Niobium Powder: Method of Stabilizing Porosity and Fractal Properties Leonid Skatkov	429
Author Index	437