Preface

Sintering is a necessary and decisive step in ceramic processing conducted to obtain dense or porous, micro- or nano-structured ceramics for electronics, biomedical or energy applications. Development of advanced ceramic materials with high performance and tailored microstructure is made possible through various sintering techniques, such as pressure-assisted sintering, reactive sintering, field-assisted sintering (e.g., spark plasma sintering), etc. The purpose of this special issue is to present advances and developments in the area of “Microstructural Design and Control of Ceramic through Sintering.”

This special issue of the Journal of the Ceramic Society of Japan includes 4 review papers and 20 original articles, and covers fundamental aspects of sintering, modeling and simulation, microstructure evolution, texture formation, and emerging technologies such as flash sintering. Most of the 24 articles were submitted based on invitations by guest editors. All the manuscripts published in this issue were peer-reviewed according to the editorial policies of the journal, and only those meeting the criteria were accepted for publication.

The guest editors wish to thank the peer reviewers for their great efforts and time which they contributed to this special issue. The special issue is supported by JSPS Grants-in-Aid for Scientific Research (KAKENHI), Strengthening International Dissemination of Information, Grant Number 252016.

April, 1, 2016

Satoshi Tanaka  
Nagaoka University of Technology, Japan  
Guest Editor

Olivier Guillon  
Forschungzentrum Jülich & RWTH Aachen University, Germany  
Guest Editor

Eugene A. Olevsky  
San Diego State University, U.S.A.  
Guest Editor

Fumihiro Wakai  
Tokyo Institute of Technology, Japan  
Guest Editor

Toshihiko Tani  
Toyota Central R&D Labs., Inc. & Toyota Technological Institute, Japan  
Guest Editor and Senior Associate Editor of the Journal of the Ceramic Society of Japan
Reviews

Mixed control of boundary migration and the principle of microstructural evolution
Suk-Joong L. KANG, Seok-Young KO and Seung-Yoon MOON
DOI http://dx.doi.org/10.2109/jcersj2.15262

Microstructure development and texture formation in lead-free piezoelectric ceramics prepared by templated grain growth process
Toshio KIMURA
DOI http://dx.doi.org/10.2109/jcersj2.15238

Beyond flash sintering in 3 mol % yttria stabilized zirconia
Shikhar K. JHA, Kalvis TERAUDS, Jean-Marie LEBRUN and Rishi RAJ
DOI http://dx.doi.org/10.2109/jcersj2.15248

Network distribution of reinforcements in composites produced by sintering: microstructure formation and influence on consolidation behavior and properties
Dina V. DUDINA, Boris B. BOKHONOV and Amiya K. MUKHERJEE
DOI http://dx.doi.org/10.2109/jcersj2.15224

Full papers

Effects of phase and doping on flash sintering of TiO₂
Yuanyao ZHANG, Jiuyuan NIE and Jian LUO
DOI http://dx.doi.org/10.2109/jcersj2.15255

A comparative study of different sintering models for Al₂O₃
Chung VAN NGUYEN, Sree Koundinya SISTLA, Stanley VAN KEMPEN, Ngoc Anh GIANG, Alexander BEZOLD, Christoph BROECKMANN and Friederike LANGE
DOI http://dx.doi.org/10.2109/jcersj2.15257

Laser oscillation and luminescence of Nd³⁺- and Eu³⁺-doped Lu₂O₃ transparent ceramics fabricated by spark plasma sintering
Akihiko ITO, Liqiong AN and Takashi GOTO
DOI http://dx.doi.org/10.2109/jcersj2.15302

Microstructure and microchemistry of flash sintered K₀.₅Na₀.₅NbO₃
Gulcan CORAPCIÖGLU, Mehmet Ali GULGUN, Kim KISLINGER, Sas STURM, Shikhar.K. JHA and Rishi RAJ
DOI http://dx.doi.org/10.2109/jcersj2.15290

Phase-field study of pore-grain boundary interaction
Johannes HÖTZER, Veronika REHN, Wolfgang RHEINHEIMER, Michael J. HOFFMANN and Britta NESTLER
DOI http://dx.doi.org/10.2109/jcersj2.15266

Sintered ceramics with controlled microstructures: numerical investigations with the Discrete Element Method
Christophe L MARTIN, Zilin YAN, David JAUFFRES, Didier BOUVARD and Rajendra K BORDIA
DOI http://dx.doi.org/10.2109/jcersj2.15269

Sintering and grain growth in SrTiO₃: impact of defects on kinetics
Fabian LEMKE, Wolfgang RHEINHEIMER and Michael J. HOFFMANN
DOI http://dx.doi.org/10.2109/jcersj2.15265
| Title                                                                 | Authors                                                                 | Page |
|----------------------------------------------------------------------|-------------------------------------------------------------------------|------|
| Reduction of black dots in transparent polycrystalline alumina produced by pulsed electric current sintering with various chemical powder treatments | Hien Huu NGUYEN, Makoto NANKO and Khanh Quoc DANG                         | 354  |
| Design and fabrication of micro close end tubular SOFC with internal conduction layer | Koichi KIKUTA, Kenta YASUE, Masaki SUZUKI, Shingo KANEHIRA and Sosu KIRIHARA | 360  |
| Effect of seeds and sintering additives on (K,Na,Li)NbO₃ lead-free single crystals grown by a solid-state crystal growth method | Jie YANG, Zhengqian FU, Qunbao YANG, Yongxiang LI and Yun LIU             | 365  |
| Fast firing of bismuth doped yttria-stabilized zirconia for enhanced densification and ionic conductivity | Hui LI, Alexander KON, Chi-Hsiu CHANG, Sangtae KIM and Ricardo H. R. CASTRO | 370  |
| Analysis of sintering behavior of silicon nitride based on master sintering curve theory of liquid phase sintering | Junichi TATAMI, Daisuke HIRATSUKA, Shigefumi OKADA, Katsutoshi KOMEYA and Toru WAKIHARA | 375  |
| TaC–NbC formed by spark plasma sintering with the addition of sintering additives | Christopher C. RUDOLF, Arvind AGARWAL and Benjamin BOESL                | 381  |
| Formation of grain boundary second phase in BaTiO₃ polycrystal under a high DC electric field at elevated temperatures | Hidehiro YOSHIDA, Akinori UEHASHI, Tomoharu TOKUNAGA, Katsumi SASAKI and Takahisa YAMAMOTO | 388  |
| Development of ZrB₂–SiC–Ti by multi stage spark plasma sintering at 1600°C | Anupam PURWAR, Ragini MUKHERJEE, Krishnamurthy RAVIKUMAR, S. ARIHARAN, Nagarajan Kirupakaran GOPINATH and Bikramjit BASU | 393  |
| Spark plasma sintering novel tooling design: temperature uniformization during consolidation of silicon nitride powder | Diletta GIUNTINI, Jan RAETHEL, Mathias HERRMANN, Alexander MICHAELIS, Christopher D. HAINES and Eugene A. OLEVSKY | 403  |
| Effect of sintering method on the microstructure of pure Cr₂AlC MAX phase ceramics | Jesus GONZALEZ-JULIAN, Sara ONRUBIA, Martin BRAM and Olivier GUILLO         | 415  |
| Determination of the size of representative volume element for viscous sintering | Gaku OKUMA, Daiki KADOWAKI, Yutaka SHINODA, Takashi AKATSU, Olivier GUILLO and Fumihiro WAKAI | 421  |
Influence of granule characteristics on fabrication of translucent alumina ceramics with high strength and reliability
Satoshi TANAKA, Shota GOI and Zenji KATO 426
DOI http://dx.doi.org/10.2109/jcersj2.15271

Microstructural evolution of high purity alumina ceramics prepared by a templated grain growth method
Kazumasa TAKATORI, Hiroaki KADOURA, Hidehito MATSUO, Shuichi ARAKAWA and Toshihiko TANI 432
DOI http://dx.doi.org/10.2109/jcersj2.15261