

Contents

Preface	ix
Introduction	xi
MECHANICAL PROPERTIES AND PERFORMANCE	
R&D of Advanced Ceramics Activities in China and Shanghai Institute of Ceramics Chinese Academy of Sciences (SICCAS) Dongliang Jiang	3
Fabrication of Silicon Nitride—Multi-Walled Nanotube Composites by Direct In-Situ Growth of Nanotubes on Silicon Nitride Particles Amit Datye, Kuang-Hsi Wu, S. Kulkarni, H. T. Lin, J. Schmidt, D. Hunn, Wenzhi Li, and Latha Kumari	23
Synthesis of Yttria Stabilized Zirconia (3YTZP)—Multi-Walled Nanotube (MWNTs) Nanocomposite by Direct In-Situ Growth of MWNTs on Zirconia Particles Amit Datye, Kuang-Hsi Wu, V. Monroy, S. Kulkarni, S. Amruthaluri, H. T. Lin, J. Vleugels, K. Vanmeensel, Wenzhi Li, and Latha Kumari	39
Processing, Microstructure and Mechanical Properties of Ultra High Temperature Ceramics Fabricated by Spark Plasma Sintering Amit Datye, Kuang-Hsi Wu, Srinivas Kulkarni, H. T. Lin, and J. Vleugels	53
Fabrication of Carbon Fiber Reinforced Ceramic Matrix Composites Potential for Ultra-High-Temperature Applications S. M. Dong, Z. Wang, Y. S. Ding, X. Y. Zhang, P. He, and L.Gao	67
Estimation of Sintering Warpage of a Constrained Ceramic Film Kais Hbaieb	73

Long-Term Temperature Gradient Stress Relaxation Testing and Modeling of Ceramic Insulation Materials	83
James G. Hemrick, Edgar Lara-Curzio, and James F. King	
From Conventional to Fast Sintering of Zirconia Toughened Alumina Nanocomposites	91
Enikö Volceanov, Gheorghe Virgil Aldica, Adrian Volceanov, Dan Mihai Constantinescu, and Ștefania Motoc	
Fatigue Characterization of a Melt-Infiltrated Woven Hf-NiC-S/BN/SiC Ceramic Matrix Composite (CMC) Using a Unique Combustion Test Facility	103
Ted T. Kim, Shankar Mall, and Larry P. Zawada	
Effect of SiC Content and Third Phase Metal Additions on Thermal and Mechanical Properties of Si/SiC Ceramics	117
A. L. Marshall, P. Karandikar, A. L. McCormick, and M. K. Aghajanian	
Compressive Strength Degradation in ZrB_2 -SiC AND ZrB_2 -SiC-C Ultra High Temperature Composites	127
J. Ramírez-Rico, M. A. Bautista, J. Martínez-Fernández, and M. Singh	
SiC Nanometer Sizing Effect on Self Healing Ability of Structural Ceramics	137
Wataru Nakao, Shihomi Abe, and Kotoji Ando	
Creep and Fatigue Behavior of MI SiC/SiC Composites at Temperature	143
G. Ojard, Y. Gowayed, G. Morscher, U. Santhosh, J. Ahmad, R. Miller, and R. John	
Self-Crack-Healing Behavior Under Combustion Gas Atmosphere	155
Toshio Osada, Wataru Nakao, Koji Takahashi, and Kotoji Ando	
Selection of a Toughened Mullite for a Miniature Gas Turbine Engine	167
Barry A. Bender and Ming-Jen Pan	
Comparison in Foreign Object Damage between SiC/SiC and Oxide/Oxide Ceramic Matrix Composites	177
Sung R. Choi, Donald J. Alexander, and David C. Faucett	
Ti ₃ (Si,Al)C ₂ for Nuclear Application: Investigation of Irradiation Effects Induced by Charged Particles	189
Marion Le Flem, Xingmin Liu, Sylvie Doriot, Théodore Cozzika, Fabien Onimus, Jean-Luc Bechade, Isabelle Monnet, and Yanchun Zhou	

Heavy Ions Induced Damages in Ti_3SiC_2 : Effect of Irradiation Temperature	199
J.C. Nappé, Ph. Grosseau, B. Guilhot, F. Audubert, M. Beauvy, and M. Benabdesselam	
Titanium Carbide and Silicon Carbide Thermal Conductivity Under Heavy Ions Irradiation	205
J. Cabrero, F. Audubert, P. Weisbecker, A. Kusiak, and R. Pailler	
Corrosion Resistance of Ceramics in Vaporous and Boiling Sulfuric Acid	219
C.A. Lewinsohn, H. Anderson, M. Wilson, M. Sunderberg, and J. Brangefalt	
Unlubricated Clutch System Based on the Function Relevant Friction Pairing Advanced Non-Oxide Ceramic vs. Steel	227
A. Albers, S. Ott, and M. Mitariu	
Nondestructive Inspection of Ceramic Bearing Balls Using Phased Array Ultrasonics	233
J.G. Sun, E.R. Koehl, S. Steckenrider, Charlotte Vieillard, and Ton Bayer	
Thermal Expansion Coefficient of SiO_2 -Added Leucite Ceramics	241
J. P. Wiff, Y. Kinemuchi, S. Naito, A. Uozumi, and K. Watari	
GEOPOLYMERS	
Inorganic Polymers (Geopolymers) as Advanced Materials	251
Kenneth J.D. MacKenzie	
Properties and Performance of Si-Rich Geopolymer Binder Systems	263
Kwesi Sagoe-Crentsil	
Cold Setting Inorganic Networks Including Phosphates	271
Christian Kaps and Mark Hohmann	
Properties of Phosphorus-Containing Geopolymer Matrix and Fiber-Reinforced Composite	283
Oleg Bortnovsky, Petr Bezucha, Jiří Dědeček, Zdeněk Sobalík, Věra Vodičková, Dora Kroisová, Pavel Roubíček, and Martina Urbanová	
Formation of an Iron-Based Inorganic Polymer (Geopolymer)	301
Jonathan L. Bell and Waltraud M. Kriven	
Consolidated Geo-Materials from Sand or Industrial Waste	313
E. Prud'homme, P. Michaud, E. Joussein, C. Peyratout, A. Smith and S. Rossignol	

Alkali Activated Aerogels	325
Forrest Svingala and Benjamin Varela	
Author Index	335