

Table of Contents

PREFACE

Processing of Ceramic Matrix Composites	
R.R. Naslain and A.P. Nascimento Filho	3
Development of SiC Fiber-Reinforced SiC Composites by Radiation-Cured Preceramic Polymer	
M. Sugimoto, Y. Morita, T. Seguchi and K. Okamura	11
New Type of Sintered SiC Fiber and Its Composite Material	
H. Ishikawa, S. Kajii, T. Hisayuki, K. Matsunaga, T. Hogami and Y. Kohtoku	15
Fabrication of Carbon Fiber/SiSiC Composites and Their Mechanical Properties	
D.W. Shin, I.S. Kim and S.S. Park	19
Dispersion of Chopped Short Fibers in Production of Fibers-Reinforced Glass-Ceramic Matrix Composites	
J.Q. Gao, Q.W. Huang and Z.H. Jin	23
Sol-Gel Derived Al₂O₃ Fiber Dispersed with Fine YAG Particles	
A. Towata, H.J. Hwang, M. Sando and K. Niihara	27
Chemical and Mechanical Degradation of Hi-Nicalon and Hi-Nicalon-S Fibers under CVD/CVI BN Processing Conditions	
F. Rebillat, A. Guette, L. Espitalier and R.R. Naslain	31
Studies of the Spinnability of Polycarbosilane and Spinning Technology of Its Continuous Fibers	
Y. Wang, Y. Song, C. Feng, Z.G. Zou, Y. Zhao and J. Long	35
SiC-Based Fibers Synthesized from Hybrid Polymer of Polycarbosilane and Polyvinylsilane	
A. Idesaki, M. Narisawa, K. Okamura, M. Sugimoto, Y. Morita, T. Seguchi and M. Itoh	39
Fabrication of Cf/SiC Ceramic Matrix Composites by Polymer Precursor Pyrolysis	
X. Zhou, C. Zhang, J. Ma and A. Zhou	43
The Development of a Combustion Chamber Liner Utilizing a Long-Fiber Reinforced Composite Material Made Using the Poly-Silazane Impregnation Method and the Chemical Vapor Deposition Method	
K. Matsumoto, N. Fujioka, T. Hayakawa, N. Kawamura and K. Sato	49
Development of Lanthanumhexaluminate Fiber-Coating via Sol-Gel-Route Using Inorganic and Organic Precursors	
L. Mayer, B. Saruhan and H. Schneider	53
Damage Tolerant Oxide Ceramics Using Pure Fiber and Matrix Laminates	
T.C. Radick, B. Saruhan and H. Schneider	61
High Performance Tyranno (Si-C-M-O) Fibers for Composites	
S. Masaki and T. Yamamura	67
Mechanical Properties and Microstructural Characteristics of Carbon Fiber Reinforced Silicon Carbide Matrix Composites by Chemical Vapor Infiltration	
Y. Xu, L. Cheng, L.J. Zhang and D. Yan	73
An Effective Process for Silicon Carbide Matrix Composites: Dual-Composition Solution Impregnation and Pyrolysis under Medium Pressure	
W. Zou, T. Wan, J. Su, L. Yan and J. Lu	77
Sol-Gel Processing of Silicon Based Matrixes for Carbon Fiber Reinforced Ceramic Composites	
S. Manocha, D. Vashistha and L.M. Manocha	81
Development and Properties of an Oxide Fiber-Oxide Matrix Composite	
S.M. Johnson, Y.D. Blum and C.H. Kanazawa	85
Processing and Microstructure of Polymer-Derived Oxide Composite Materials	
D. Suttor and G. Ziegler	91
Fabrication and Mechanical Properties of Reaction Sintered Silicon Carbide Matrix Composite	
T. Kameda and Y. Itoh	95
SiC Fiber Reinforced Si₃N₄ Ceramics with Self-Diagnosis Function	
Y. Takagi, H. Matsubara and H. Yanagida	99

Processing and Mechanical Properties of C-Fiber Reinforced SiCN-CMCs	103
B. Rothe, D. Suttor and G. Ziegler	
Processing and Characterization of Carbon Fiber Reinforced Ceramic Nanocomposites	105
N.H. Tai, K.P. Lee, H.H. Cheng and C.S. Liu	
In-situ Synthesis and Oxidation Resistance of C-SiC-TiC-TiB₂ Composite	109
H.N. Xiao, Q.Q. Yang and Q.Z. Huang	
Fabrication and Characterization of 3D C/SiC Composites via Slurry and PCVI Joint Process	113
K. Suzuki, S. Kume, K. Nakano and T.W. Chou	
Processing and Characterisation of Silicon Carbide Fibre Reinforced MoSi₂-Based Composites	117
A.R. Bhatti, R.N. Moss, R. Piller, R.A. Shatwell and R. Slightam	
Process and Properties of Fiber-Reinforced Ceramic Matrix Composites with Function of Fracture Detection	121
M. Asayama, M. Sando and K. Niihara	
Micromechanical Analysis of CMC Structural Members Based on Homogenization Method	127
K. Kageyama and I. Kimpara	
Mechanical Properties of Coating Free SiTiCO Fiber-Reinforced SiC Matrix Composites	133
T. Mamiya, Y. Kagawa, Y. Shioji, M. Sato and T. Yamamura	
Mechanical Properties of Carbon Fiber-Reinforced hBN Matrix Composites at Elevated Temperature	137
Y. Matsuo, S. Kumagai and K. Yasuda	
Fracture Behavior of Unidirectional Si-Ti-C-O Fiber- Bonded Ceramic Composite Materials	141
M. Tanaka, S. Ochiai, M. Hojo, T. Ishikawa, S. Kajii, K. Matsunaga and T. Yamamura	
Mechanical Properties of C/C Composites	145
B. Thielicke	
Geometry Determination of Cruciform-Type Specimen and Biaxial Tensile Test of C/C Composites	151
Y. Ohtake, S. Rokugawa and H. Masumoto	
Modelling of the Mechanical Behavior of a 2.5D C/C Composite under Tensile and Shear Loads at Room Temperature	155
O. Siron and J. Lamon	
Damage Modelling at the Mesoscopic Scale for 4D Carbon/Carbon Composites	159
X. Aubard, C. Cluzel, L. Guitard and P. Ladeveze	
Formation of a CVI-SiC Matrix Coating Reinforced by Carbon Fiber on a 2-D Woven C/C Substrate	163
A. Otsuka, K. Sakamoto, T. Takahashi, Y. Ohtake, G. Zhang, S. Ueno and H. Masumoto	
Determination of the Interlaminar Tensile Strength of a C/C-Composite by the Diametral Compression Test at Temperatures up to 1800°C	167
U. Soltész, B. Schäfer and B. Thielicke	
Shear Failure Behavior of Continuous Fiber Reinforced Ceramic Matrix Composites	171
Y. Ishiguro, T. Akatsu, Y. Tanabe and E. Yasuda	
Anomalous Strain Behaviour under Stress Controlled Loading of CFCCs	175
M. Steen, C. Filiou and P. Bonnel	
Toughened Silicon Carbide Based Composites by Microstructure Design and Processing	179
D.L. Jiang	
A Novel Technique of Using Interfacial Debonding to Measure Fiber-Bridging Stress in Ceramic Composites	185
Y.J. Sun and R.N. Singh	
Themomechanical Behavior and Microstructure of Tyrannohex Composites	189
M. Drissi-Habti, J.F. Després, K. Nakano, H. Hatta and T. Ishikawa	
Fracture Behavior of Cross-Ply Laminates Carbon-Carbon Composites	193
K. Goto, L. Denk, H. Hatta, Y. Kogo and S. Somiya	
Creep Behavior and Modeling of SiC-Based PC Ceramic Matrix Composites with Glass Sealant in High Temperature Air	197
T. Ishikawa, N. Suzuki, I.J. Davies, M. Shibuya, T. Hirokawa and J. Gotoh	
In situ Properties of 3-D Woven SiC/SiC-Based Composite	201
I.J. Davies, T. Ishikawa, M. Shibuya, T. Hirokawa and J. Gotoh	

Probabilistic-Statistical Approach to Matrix Cracking in Ceramic Matrix Composites (CMCs)	205
V. Calard and J. Lamon	
Failure Mechanisms and the Macro-Response of Carbon Fiber Reinforced SiC Matrix Composites	209
J. Varna and T. Hansson	
Triaxially Braided C/SiC Composites: Research and Development by the Combined Process of CVI+PIP	213
W. Zou, M. Song, T. Wan, L. Yan and K. Wan	
Microstructure and Mechanical Properties of Hot-Pressed Silicon Carbide Fiber-Reinforced Silicon Carbide Composite	217
K. Yoshida, M. Imai and T. Yano	
Tensile Matrix Cracking Behavior of Hi-Nicalon Fiber/Glass Matrix Cross-Ply Laminate Composites	221
T. Okabe, N. Takeda, J. Komotori, M. Shimizu, K. Imai and Y. Imai	
Effect of the Open Porosity on the Flexural Strength of 2-D Woven Carbon Fiber Reinforced SiC/C Matrix Composites by Reaction-Bonding	225
E. Tani, K. Shobu and T. Nakashima	
The Pretreatment on Carbon Fibers for C/SiC Composites	229
L. Yan, M. Song, T. Wan and W. Zou	
Triaxially Braided C/SiC Composites: Structure and Properties	233
W. Zou, J. Lu, M. Song, S. Qiao and S. Bai	
Triaxially Braided C/SiC Composites: A High Temperature, Lightweight, Nozzle Material	237
W. Zou, L.T. Yan, T. Wan and M. Song	
Three Dimensional Crack-Fiber Interaction Process in Fiber-Reinforced Ceramic Matrix Composite: Model Experiment	241
T. Ito and Y. Kagawa	
Mechanical Behavior of a Si-Ti-C-O Fiber-Bonded Ceramic Material	245
L.P. Zawada and T. Ishikawa	
Static Fatigue of 2D SiC/SiC Composites with Multilayered (PyC-SiC)_n Interphases at High Temperatures in Air	249
S. Pasquier, J. Lamon and R.R. Naslain	
On the Way to the Equivalence between Measured Parameters Using Non-Notched and Notched Woven Specimens of SiC/C/SiC Composites	253
M. Drissi-Habti, J. Chermant and D. Rouby	
Design of Room Temperature Tensile Test Specimen Made of Ceramic Matrix Composites	257
J.L. Shi, L. Brady and A. Ireson	
From the Yarn to the Bulk: A Meso-Macro Approach of the Mechanical Behaviour of 2D Ceramic Matrix Composites	261
M. Boussuge and E. Munier	
High Temperature Behaviours of Two Nanocomposite Oxide Fibres	265
F. Deléglise, M.H. Berger, J. Pitchford and A.R. Bunsell	
Thermal Stability of Glass-Sealed Si-Ti-C-O Fiber Reinforced SiC Composite	271
M. Suzuki, T. Yoshida, M. Shibuya, J. Gotoh and M. Imuta	
Structure and Materials of a Multi-Layer Coating for the Oxidation Protection of C/C Composites up to 1700°C	275
L. Cheng, Y. Xu and L.J. Zhang	
Thermal Expansion Behaviour of High Melting Point Oxides	279
M.- Antti, O. Babushkin, Z. Shen, M. Nygren and R. Warren	
Characterization of Coating Cracks in Oxidation-Resistant SiC Coating on C/C Composites	283
T. Aoki, H. Hatta, K. Goto and H. Fukuda	
High-Temperature Properties of Newly Developed Advanced SiC Fibers	287
H. Serizawa, C. Lewinsohn, G.E. Youngblood, R.H. Jones, D.E. Johnston and A. Kohyama	
Oxidation Behavior of Glass-Protected Tyranno-Hex Ceramic Matrix Composites	291
M. Drissi-Habti, S. Sakakibara, K. Nakano, K. Suzuki, T. Yarii and Y. Kanno	
Effects of Matrix Cracking on the Creep of SiC-SiC Microcomposites	297
R.E. Tressler, K.L. Rugg, C.E. Bakis and J. Lamon	

Tensile Creep Properties of Si-M-C-O (M=Ti or Zr) Fibers in Air Derived from Polymer Precursors	303
M. Narisawa, K. Sogame, K. Okamura, M. Sato and T. Yamamura	
Some Recommendations for Long Term High Temperature Tests	309
G. Boitier, H. Cubéro and J. Chermant	
Creep at the Mesoscopic and Microscopic Scale of 2.5D C_f-SiC	313
G. Boitier, J. Vicens and J. Chermant	
Macroscopic Creep of 2.5D C_f-SiC	317
G. Boitier, J. Chermant and J. Vicens	
Fatigue Behavior at High Temperature in Air of a 2D Woven SiC/SiBC with a Self Healing Matrix	321
P. Carrère and J. Lamon	
Cyclic Fatigue Behaviour at Room Temperature and at High Temperature under Inert Atmosphere of a C/SiC Multilayer Composite	325
A. Dalmaz, P. Reynaud, D. Rouby, G. Fantozzi and M. Bourgeon	
Improvement of Cyclic Fatigue Analysis by the Use of a Tensile Master Curve in Carbon/Carbon Composites	329
C. Tallaron, D. Rouby, P. Reynaud and G. Fantozzi	
Subcritical Crack Growth Mechanisms and Failure Mechanism Maps for Ceramic Matrix Composites	333
C. Lewinsohn, C.H. Henager, Jr. and R.H. Jones	
Nanocreep of Carbon Fibers in 2.5D C_f-SiC	337
G. Boitier, J. Vicens and J. Chermant	
Tensile Behavior of Woven Ceramic Matrix Composites at Room and Elevated Temperature: An Experimental and Numerical Study	341
A. Haque, M. Rahman, U. Vaidya, H. Mahfuz and S. Jeelani	
Thermal Cycling, Thermal Aging and Thermal Shock Behavior of Nicalon-Fiber Reinforced Glass Matrix Composites	345
A.R. Boccaccini, H. Kern, J. Janczak-Rusch, C.B. Ponton and K.K. Chawla	
Development of Interfaces in Oxide Matrix Composites	351
M.H. Lewis, A. Tye, E. Butler and I. Al-Dawery	
(PyC/SiC)_n and (BN/SiC)_n Nanoscale-Multilayered Interphases by Pressure Pulsed-CVI	357
S. Bertrand, O. Boisron, R. Pailler, J. Lamon and R.R. Naslain	
Multilayerd Interphases in SiC/SiC Composites: Influence of the Interfacial Bond Strength on the Interfacial Characteristics	361
F. Rebillat, J. Lamon and R.R. Naslain	
A Multilayer Ceramic Matrix for Oxidation Resistant Carbon Fibers-Reinforced CMCs	365
F. Lamouroux, S. Bertrand, R. Pailler and R.R. Naslain	
Methodology for Assessing the Interfacial Sliding Stress of a 2D Woven SiC-SiC Composite	369
J.-. Morvan and S. Baste	
Modeling of Interfacial Debonding in Unidirectionally Fiber-Reinforced Ceramics	373
S. Ochiai, M. Tanaka and M. Hojo	
Role of Roughness in Fibre/Matrix Interface Behaviour	379
D. Rouby and H. Cherouali	
Mullite/ZrO₂ Laminate Composites for High Temperature Applications	385
S.Y. Park, B. Saruhan and H. Schneider	
Fiber Reinforced Porous Alumina Substrate Consisting of Layer with Distinct Grain Sizes	391
M. Nagayama, Y. Shigegaki, A. Oka, T. Sugita, K. Miyahara and T. Sasa	
Oxidation Behavior of Ceramic Fibers from the Si-C-N-O System and Sub-Systems	395
G. Chollon	
Polyfunctional Interface Coatings for High Temperature Resistant Ceramic Composite of SiC/SiC Type	
A.M. Tsirlin, V.G. Gerlivanov, E.K. Florina, Y.E. Pronin, V.G. Syrkin, A.A. Uelskii, A.V. Grebenshchikov and M.A. Khatsernov	399
Properties of Advanced Fibers for SiC/SiC Composite Applications in Fusion Energy Systems	405
R.H. Jones, C. Lewinsohn, G.E. Youngblood and A. Kohyama	
Designing of Textile Preforms for Ceramic Matrix Composites	409
T.W. Chou	

Design, Fabrication and Characterization of High Temperature Joints in Ceramic Composites	
M. Singh	415
Design of High Preformance CMC Brake Discs	
W. Krenkel and T. Henke	421
Tailoring of Interface Mechanical Properties in Al₂O₃ Fiber-Reinforced Al₂O₃ Matrix Composite	
H. Kakisawa and Y. Kagawa	425
Morphology of Ceramic Matrix Composites	
J. Chermant	429
Joining of Si-Ti-C-O Fiber Reinforced Ceramic Composite and Fe-Cr-Ni Stainless Steel	
M. Nakamura, M. Mabuchi, N. Saito, Y. Yamada, M. Nakanishi, K. Shimojima and I. Shigematsu	435
Development of High Temperature Materials Including CMCs for Space Application	
M. Imuta and J. Gotoh	439
CMC for Hot Structures and Control Surfaces of Future Launchers	
U. Trabandt, H.G. Wulz and T. Schmid	445
Low Cost Processing for C/C-SiC Composites by Means of Liquid Silicon Infiltration	
R. Kochendörfer	451