Carbon/Carbon Composites

Thin-Film Preparation of C/C Composites and CMC using the Broad Argon ION Beam Method
P Weisbecker, A Guette (LCTS)
A new device (ION Slicer JEOL) using a Broad Ar ION Beam was successfully used for the thin-films preparation of C/C composites and CMC. Thin-films obtained can be prepared in a short period of time and present fewer artifacts than typical methods. Images obtained with the ION Slicer are compared to those obtained with typical methods. (D3:1)

Effect of Electrochemical Treatment of the Pan-Based Carbon Fiber using Different Electrolytes
H Cao, J Cong (Harbin Inst of Tech & Shenzhen Aerospace Tech Innov Inst) G Li (Shenzhen Aerospace Tech-Innov Inst)
The mechanism of electrochemical modification in different electrolytes is studied and the influence of different electrolytes on the effect of carbon fiber’s treatment is investigated. (D3:2)

Biomimetic Nano-Composite Actuator Based on Fullerene Reinforced Nafion Ionic Polymer
JH Jung, V Sridhar, IK Oh (Chonnam National Univ)
The nano-composite actuator based on Fullerene and Nafion has been newly developed. The tensile test, IEC, water uptake, and actuation performances at various conditions are tested to define the characteristics of the nano-composite actuator. The novel actuator shows much larger deformation and better performance than pure Nafion based actuator. (D3:3)

Effect of the Fabrication Process on the Properties of Pitch-Based Carbon-Carbon Composites
L Guo, H Li, K Li, D Zhang (Northwestern Polytechnical Univ)
Short carbon fibers reinforced pitch-based carbon-carbon composites (SCFRCs) were fabricated under atmospheric environment using the mould pressing and semicarbonization shaping technology. The effect of the molding pressure and molding temperature on the density and the mechanical properties of the SCFRCs was studied in detail. (D3:4)

Influence of Anisotropy of Pyrolytic Carbon on Effective Properties of Carbon/Carbon Composites
I Tsukrov, B Drach, TS Gross (Univ of New Hampshire)
Effective elastic properties of carbon/carbon composites fabricated by chemical vapour infiltration are predicted taking into account the cylindrical orthotropy of pyrolytic carbon layers. Microscopic observations are used to characterize microstructure of the composite. Modeling predictions are validated by comparison with experimental data. (D3:5)

Investigation for Carbon/Carbon Composite Made from Single-Walled Carbon Nanotube(SWNT) Buckypaper/Pitch
NG Yun (Agency for Defense Development)
Carbon/carbon composite used single walled carbon nanotube (SWNT) buckypaper as reinforcement material and pitch as matrix was developed. Pitch was impregnated into buckypaper using toluene and drying, stabilization, carbonization process was performed in sequence. Carbonization was repeated to increase pitch contents and density of carbon/carbon composite up to 3 times. (D3:5A)
Tensile Strength of Carbon-Carbon Composites at High Temperature up to 2773K
H Kobayashi, M Koyama, H Fukuda (Tokyo Univ of Science) K Goto, H Hatta (Japan Aerospace Exploration Agency)
Author's previous works revealed that tensile strength of C/C especially enhances up at 2773K. In order to reveal the mechanisms of the remarkable enhancing tensile strength at 2773K, mechanical properties of the C/C subjected to different heat treatment temperatures and to pre-creep deformation were examined. A course of discussion lead to a conclusion that creep deformation of fiber is a main source of the strength enhancement. (D3.6)

Development and Characterization of 3D C/C Composites for Fusion Applications
A Centeno, C Blanco, R Santamaria, M Granda, R Menendez (Instituto Nacional del Carbón (CSIC) G Pintsuk, J Linke (Juelich) C Gualco (Ansaldo)
This paper studies the development of 3D titanium doped carbon matrix-carbon fibre reinforced composites (CFCs) via liquid impregnation of mesophase pitch. The undoped materials were also prepared in order to study the influence of the dopant on the microstructure and properties. (D3:7)

Modeling of Effective Elastic Properties of Carbon/Carbon Laminates
R Piat, T Böhlke, S Dietrich, J-M Gebert, A Wanner (Univ of Karlsruhe)
Three-dimensional structural information obtained by X-ray computed tomography on carbon/carbon laminates is used as input for a mechanical model describing the elastic behaviour of the composite. The model is based on a homogenization procedure consisting of three sequential steps covering the fiber and matrix interaction, the pores, the laminate structure. (D3:8)

Verification of Non-Destructive Evaluation for C/C Composites using Electrical Technique
M Koyama, T Uno, H Fukuda (Tokyo Univ of Science) H Hatta (JAXA)
The establishment of the evaluating of fiber-matrix interfacial condition at the fabricated stage is required to apply C/C composite for structures. In this study, non-destructive evaluation using electrical method was focused. The impedance measurement for the C/C specimens with several interfacial was performed. (D3:9)

Innovative Uses of Next Generation of Carbon/Carbon Composites
MS Aly-Hassan*, H Hamada (KIT) T Ogasawara, H Hatta (*also at JAXA)
Recently, novel heat-directed carbon/carbon composites have been developed by our group in JAXA and KIT. The heat-directed carbon/carbon composites are controlled-multifunctional composites which contain spatial variations in both of reinforcements and matrix for the specific purpose of controlling the heat transfer by conduction on the in-plane direction of the hot structures. (D3:10)