

## CONTENTS

### *Symposium of Nanostructure Coating*

<b>Preface</b> .....	<b>375</b>
<b>Microstructure and Sintering Behavior of Hafnia-based Thermal Barrier Coating by EB-PVD Process</b> .....	<b>377</b>
Kazuhide Matsumoto, Yoshiyasu Itoh, Yutaka Ishiwata and Takeharu Kato	
<b>A New Laser CVD Process for Thermal Barrier Coatings</b> .....	<b>381</b>
Takashi Goto, Teiichi Kimura and Hidetoshi Miyazaki	
<b>Thermal Conductivity of Yttria-stabilized Zirconia Films Measured by a Laser-heating AC Method</b> .....	<b>385</b>
Teiichi Kimura and Takashi Goto	
<b>Microstructure of YSZ Films Prepared by MOCVD</b> .....	<b>389</b>
Rong Tu, Teiichi Kimura and Takashi Goto	
<b>New Oxide Compounds for Thermal Barrier Coating</b> .....	<b>393</b>
I. Nagano, K. Akiyama, M. Shida, S. Ohta and Y. Murakami	
<b>Microstructure Modification of YSZ Layers Prepared by EB-PVD</b> .....	<b>397</b>
Norio Yamaguchi, Kazushige Kimura and Hideaki Matsubara	
<b>Alumina-Zirconia Composite Coating Fabricated from Nano-size Powders</b> .....	<b>401</b>
Satoshi Sodeoka, Masato Suzuki and Takahiro Inoue	
<b>Alumina-based Nano Composite Coating Prepared by Plasma Spray</b> .....	<b>405</b>
Masato Suzuki, Satoshi Sodeoka and Takahiro Inoue	
<b>Design of Thin Films with Tailored Nano-morphology</b> .....	<b>409</b>
Motofumi Suzuki, Kenji Kimura and Yasunori Taga	
<b>The Effect of Processing Temperature on the Columnar Structure of ZrO<sub>2</sub>-4mol%Y<sub>2</sub>O<sub>3</sub> Thermal Barrier Coatings Fabricated by Electron Beam Physical Vapor Deposition</b> .....	<b>413</b>
Kunihiko Wada, Norio Yamaguchi and Hideaki Matsubara	
<b>Analysis of Thermal Conductivity and Thermal Diffusivity of EB-PVD Coating Materials</b> .....	<b>417</b>
Byung-Koog Jang and Hideaki Matsubara	
<b>TEM and XPS Analysis of (Ti,Cr)CN/DLC Superhard Nanocomposite Coatings</b> .....	<b>421</b>
Yongqing Fu, Sam Zhang and Hejun Du	
<b>Stress Depth Profile in Ceramic Films on Different Interfacial Layers</b> .....	<b>425</b>
Shin Tsuchiya, Takatoshi Oshika, Fumio Tsushima and Akio Nishiyama	
 <i>Symposium of Scanning Probe Nanotechnology</i>	
<b>Preface</b> .....	<b>429</b>
<b>Nanolithography and Nanochemistry Utilizing Scanning Probe Techniques: Directed Self-Assembly of Sub-Micrometer-Sized Structures by Scanning Probe Lithography Defined Templates</b> .....	<b>431</b>
Daan Wouters, Jordy P. E. Sturms and Ulrich S. Schubert	
<b>Self-Organized Nanostructure Formation on High-Index Si Surfaces Induced by Ga</b> .....	<b>435</b>
Hitoshi Nakahara, Hidetoshi Suzuki and Ayahiko Ichimiya	
<b>Designer DNA: Design and Synthesis of DNA Nanostructures</b> .....	<b>439</b>
Rika Mizuno, Hiroataka Haruta, Takashi Morii, Takao Okada, Kenichi Nakashi, Takeshi Asakawa and Hayashi Kenshi	

<b>UHV-STM/STS Studies of Lanthanum Endohedral Metallofullerenes</b> .....	<b>443</b>
Atsushi Taninaka, Haruhito Kato, Kazuhiro Shino, Toshiki Sugai, Seiji Heike, Yasuhiko Terada, Tomihiro Hasizume and Hisanori Shinohara	

*Symposium of Preparation and Characterization of Nanohelical / Spiral Substances*

<b>Preface</b> .....	<b>447</b>
<b>Microstructure of Carbon Coils</b> .....	<b>449</b>
T. Hashishin, H. Iwanaga, Y. Furuya, S. Motojima and Y. Hishikawa	
<b>Electric and Mechanical Properties of Carbon Coils</b> .....	<b>453</b>
T. Hashishin, H. Iwanaga, S. Motojima and Y. Hishikawa	
<b>Preparation and Properties of Super-Elastic Carbon Microcoils by Ni-catalyzed CVD</b> .....	<b>457</b>
S. Yang, H. Aoki, X. Chen and S. Motojima	
<b>Electromagnetic Wave Absorption Properties of Carbon Microcoils/Nanocoils</b> .....	<b>461</b>
S. Motojima, D. Nagahara, T. Kuzuya and Y. Hishikawa	
<b>Preparation of Ceramics/Carbon Microcoils Composites using Carbon Microcoils as a Template</b> .....	<b>465</b>
S. Motojima, T. Muraki, T. Suzuki, S. Yang, X. Chen, T. Hashishin, H. Iwanaga and Y. Hishikawa	
<b>Structure of Carbon Coils Observed by Neutron Diffraction</b> .....	<b>469</b>
T. Fukunaga, K. Itoh, T. Kuzuya, Y. Hishikawa and S. Motojima	
<b>Graphite Nanofibers-A Unique Catalyst Support Media</b> .....	<b>473</b>
N. M. Rodriguez, J. Ma and T. K. Baker	
<b>Cosmo-mimetic Helical/Spiral Materials and Their Potential Applications</b> .....	<b>477</b>
S. Motojima, X. Chen, S. Yang, H. Iwanaga, Y. Hayashi, C. Kuzuya and Y. Hishikawa	
<b>Morphologies, Microstructure and Growth Mechanism of Carbon Nanocoils over Stainless Steel Catalysts</b> .....	<b>481</b>
S. Yang, X. Chen, T. Hashishin, H. Iwanaga and S. Motojima	
<b>Preparation and Morphologies of Elastic Carbon Microcoils/nanocoils by Various Catalysts</b> .....	<b>485</b>
S. Yang, X. Chen and S. Motojima	
<b>Preparation of Carbon Microcoils/Nanocoils and Their Morphologies</b> .....	<b>489</b>
S. Motojima, S. Yang, X. Chen, T. Muraki, K. Takeuchi and H. Iwanaga	
<b>Hydrogen Absorption of Carbon Micro Coils</b> .....	<b>493</b>
Y. Furuya, K. Himeshima, Y. Inoue, S. Izumi, T. Hashishin, H. Iwanaga, S. Motojima and Y. Hishikawa	
<b>Effects of Mechanical Milling on Hydrogen Absorption Behavior of Carbon Micro Coils</b> .....	<b>497</b>
Y. Furuya, S. Izumi, M. Saikawa, K. Himeshima, T. Hashishin H. Iwanaga, S. Motojima and Y. Hishikawa	
<b>Synthesis of Twisted Carbon Nanofiber by Catalytic CVD Method</b> .....	<b>501</b>
Takashi Katsumata, Youhei Fujimura, Makoto Nagayama, Hiroshi Tabata, Hirofumi Takikawa, Yoshihiko Hibi, Takeki Sakakibara and Shigeo Itoh	
<b>Carbon Nanohelical Coils and Nanotubes Preparation Using Metal Clusters Synthesized by Plasma-Gas-Condensation</b> .....	<b>505</b>
T. Hihara, S. Hirako, S. Motojima, Y. Yamamoto, T. Mizuno, M. Tanemura and K. Sumiyama	
<b>Morphology and Helical Growth Mechanism of Plasmalemma in Cotton Fiber</b> .....	<b>509</b>
Krakhmalev V. A. and Paiziev A. A.	
<b>Direct Observation of the Growth of Helical and Spiral Graphite Nanofibers</b> .....	<b>515</b>
R. Terry K. Baker	

<b>Vapor Phase Preparation of Carbon Nanocoils by Noble Metal Catalysts</b> .....	<b>519</b>
S. Motojima, S. Hirako, T. Kuzaya and X. Chen	

### *Symposium of Nano-Carbons and Related Structures*

<b>Preface</b> .....	<b>523</b>
<b>Solubilization of Carbon Nanotubes with a Pyrene-carrying Polymer in Water</b> .....	<b>525</b>
Naotoshi Nakashima, Shingo Okuzono, Yasuhiko Tomonari and Hiroto Murakami	
<b>Nanohorns Particle Including Metal-Nanocapsule Formed by Arc Discharge in Liquid Nitrogen</b> .....	<b>529</b>
Noriaki Sano, Jun Nakano, Takeyuki Kikuchi and Tatsuo Kanki	
<b>Selective Formations of Fe-Included Carbon Nanocapsules and Nanotubes by Pyrolysis of Ferrocene</b> .....	<b>533</b>
Noriaki Sano, Hiroshi Akazawa, Matsuto Uehara, Takeyuki Kikuchi and Tatsuo Kanki	
<b>Liquid Phase Synthesis of the Nanowhiskers of Fullerene Derivatives</b> .....	<b>537</b>
Kun'ichi Miyazawa, Tadahiko Mashino and Tadatomo Suga	
<b>Cap-Formation Process of a Carbon Nanotube</b> .....	<b>541</b>
Ayumu Yasuda and Wataru Mizutani	
<b>Preparation of Fullerodendrimers by the Use of a Diels-Alder Reaction</b> .....	<b>545</b>
Yutaka Takaguchi, Yasushi Yanagimoto, Sadao Tsuboi, Takatsugu Wakahara and Takeshi Akasaka	
<b>Continuous Synthesis of Nanocarbons Using an Induction Plasma Reactor</b> .....	<b>549</b>
German Cota, Gervais Soucy, Andrej Huczko and Hubert Lange	
<b>Quasiparticle Band Structure of Carbon Nanotubes</b> .....	<b>553</b>
Takashi Miyake and Susumu Saito	
<b>Effect of Multi-Catalysts on Carbon Nanofiber Synthesis in CVD</b> .....	<b>559</b>
Beibei Chen, Youhei Fujimura, Takashi Katsumata, Hirofumi Takikawa, Yoshihiko Hibi, Tateki Sakakibara and Shigeo Itoh	
<b>Application of Density Functional Heaviside-Fermi Level Operator Formalism to Large Molecules and Nanoscale Materials</b> .....	<b>563</b>
Kin-ichi Masuda-Jindo, Vu Van Hung and Shuji Obata	

### *Symposium of Innovative Nanomaterials Using Ion Technology*

<b>Preface</b> .....	<b>567</b>
<b>Nanotech Net Working of New Materials using Pulsed Power Technology</b> .....	<b>569</b>
Kiyoshi Yatsui, Hisayuki Suematsu, Chuhyun Cho, Makoto Hirai, Tsuneo Suzuki and Weihua Jiang	
<b>Improvement of Nerve-Cell Affinity of Silicone Rubber by Carbon-Negative-Ion Implantation and Its Application to Rat Sciatic Nerve Regeneration</b> .....	<b>575</b>
Hiroshi Tsuji, Masayoshi Izukawa, Yoshiyuki Utagawa, Ryosuke Ikeguchi, Ryosuke Kakinoki, Hiroko Sato, Yasuhiro Gotoh and Junzo Ishikawa	
<b>Observation of Ion Implanted Materials Using 3D Electron Microscope</b> .....	<b>581</b>
Tomohiro Kobayashi and Masaya Iwaki	
<b>Formation of Patterned Cellular Chips by Ion-beam Irradiation into Biodegradable Polymer</b> .....	<b>587</b>
Tasuku Yotoriyama, Yoshiaki Suzuki, Takeo Tsukamoto and Masaya Iwaki	
<b>Ion Beam Irradiated ePTFE Remarkably Improving Fibrin Glue and Tissue Adhesion</b> .....	<b>591</b>
N. Takahashi, Y. Suzuki, H. Ujiie, T. Hori and M. Iwaki	

<b>Ion-Beam Modification of Coronary Stent Grafts</b> .....	<b>595</b>
Kenji Kyo, Yoshiaki Suzuki, Makoto Kaibara, Youichi Sugita, Shiho Nakamura, Akira Ogawa and Masaya Iwaki	
<b>Ion Implantation into ePTFE for Therapy of Broad-based Brain Aneurysms</b> .....	<b>599</b>
Y. Ono, T. Tsukamoto, N. Takahashi, T. Yotoriyama, Y. Suzuki, M. Iwaki, H. Ujiie and T. Hori	
<b>Effects of Ion Microbeam Irradiation on Silica Glass</b> .....	<b>603</b>
H. Nishikawa, K. Fukagawa, T. Yanagi, Y. Ohki, E. Watanabe, M. Oikawa, T. Kamiya and K. Arakawa	
<b>Iron Nano-Clusters in SiO<sub>2</sub> Synthesized by Ion Implantation and the Magnetic Properties</b> .....	<b>607</b>
T. Moriwaki, N. Hayashi, I. Sakamoto, H. Tanoue, T. Toriyama and H. Wakabayashi	
<b>Size Distribution Control of Alpha-ion Nano-particles in Ion-implanted Al<sub>2</sub>O<sub>3</sub> by Multi-step Implantation Combined with Moderate Annealing</b> .....	<b>611</b>
Shinichiro Mochizuki, Hidehiko Wakabayashi, Tamotsu Toriyama, Isao Sakamoto and Nobuyuki Hayashi	
<b>Magneto-optical Kerr Effect of Nickel Nanoparticles in SiO<sub>2</sub> Fabricated by Negative-ion Implantation of 60 keV</b> .....	<b>615</b>
H. Amekura, Y. Takeda, K. Kono and N. Kishimoto	
<b>Nonlinear Optical Response of Metal Nanoparticle Composites for Optical Applications</b> .....	<b>619</b>
Yoshihiko Takeda, Jing Lu, Nariaki Okubo, Kenichiro Kono, Oleg A. Plaksin and Naoki Kishimoto	
<b>Optical Transitions in Silica Glass During Heavy Ion Implantation</b> .....	<b>623</b>
Oleg A. Plaksin, Nariaki Okubo, Yoshihiko Takeda, Hiroshi Amekura, Kenichiro Kono, Naoki Umeda and Naoki Kishimoto	
<b>The Dielectric Constant and Crystalline Size of TiO<sub>2</sub> Films Deposited on Silicon by Use of Ionized Oxygen</b> .....	<b>627</b>
Katsuhiro Yokota, Kazuhiro Nakamura, Masami Ohnishi and Fumiyoshi Miyashita	
<b>Hardness of DLC Film Prepared Using Toluene Plasma and Hybrid Process of Plasma-based Ion Implantation and Deposition</b> .....	<b>631</b>
Yoshihiro Oka, Yoshimi Nishimura, Kingo Azuma and Mitsuyasu Yatsuzuka	
<b>Effects of Si Content in DLC Films on Their Friction and Wear Properties</b> .....	<b>635</b>
M. Ikeyama, S. Nakao, Y. Miyagawa, K. Yoshimura and S. Miyagawa	
<b>Ion Beam Modification of Al-Doped ZnO Thin Films</b> .....	<b>639</b>
O. Fukuoka, N. Matsunami, T. Shimura, M. Tazawa and M. Sataka	
<b>Reaction between Si Substrates and High-Density, High-Temperature Zr Plasma Produced by Ion-Beam Evaporation</b> .....	<b>643</b>
Takehiro Kishi, Tsuneo Suzuki, Hisayuki Suematsu, Weihua Jiang and Kiyoshi Yatsui	
<b>Elucidation of Droplet Development Process in Al Thin Films Prepared by Ion-Beam Evaporation</b> .....	<b>647</b>
Hideki Kawahara, Hiroaki Shishido, Hideki Yanagi, Takeshi Yunogami, Tsuneo Suzuki, Hisayuki Suematsu, Weihua Jiang and Kiyoshi Yatsui	
<b>Enlargement of Compositionally Gradient Area in Si-Ge Thin Films Prepared by Ion-Beam Evaporation</b> .....	<b>651</b>
Takehiko Honzawa, Tsuneo Suzuki, Makoto Hirai, Takashi Yunogami, Hisayuki Suematsu, Weihua Jiang and Kiyoshi Yatsui	