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Horiuchi S, Asaoka K, Tanaka E.	Development of a novel cement by conversion of hopeite in set zinc phosphate cement into biocompatible apatite.	Biomed Mater Eng.		In press	2009
Asaoka K, Maejima K.	Hydrogen-related degradation of mechanical properties of titanium and titanium alloys.	J ASTM Int.		In press	2009
Aida J, Ando Y, Aoyama H, tango T, Morita M.	An ecological study on the association of public dental health activities and socio-demographic characteristics with caries prevalence in Japanese 3-year-old children	<i>Caries Res</i>	40	466-472	2006
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Hirohisa Hongo, Hiroko Takano, Manabu Morita	Dense fimbrial meshwork enhances Porphyromonas gingivalis adhesiveness: a scanning electron microscopic study	Journal of Periodontal Research	42 (2)	114-118	2007
高野知承, 竹原順次, 森田学	非う蝕性歯頸部欠損と歯磨き習慣,咬合力,咬合接触面積および平均圧力との関係	口腔衛生学会雑誌	57 (5)	613-621	2007
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○Z. zhu, Y. Zhou, H. Yu, T. Nomura, B. Fugetsu	Photo-degradation of humic substances on MWCNT/nanotubular-TiO <sub>2</sub> composites	Chem. Lett.	35	890-891	2006
○Xiao-Ming Tan, Bunshi Fugetsu	Multi-walled carbon nanotubes interact with cultured rice cell: evidence of a self-defense response	Journal of Biomedical nanotechnology	3	285-288	2007
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Yu, H., Chen, X., Tusjii, K., Fugetsu, B. Fugetsu, 他6名	Use of ultra-thin cross-linked polymer films for preparation of stable mono-dispersed carbon nanotubes	Materials letters	62	4050-4052	2008
	Electrical conductivity and electromagnetic interference shielding efficiency of carbon nanotube/cellulose composite paper	Carbon	46	1256-1258	2008

Fugetsu, B., Akiba, E., Hachya, M., Endo, M.	The production of soft, durable and electrically conductive polyester multifilament yarns by dye-printing them with carbon nanotubes	Carbon	47	527-5370	2009
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Makoto Matsuoka, Tsukasa Akasaka, Takeshi Hashimoto, Yasunori Totsuka and Fumio Watari	Improvement in cell proliferation on silicone rubber by carbon nanotube coating	Bio-Medical Materials and Engineering	In press		2009
Suzuki N, Yoshimura Y, Deyama Y, Suzuki K, Kitagawa Y	Mechanical stress directly suppresses osteoclast differentiation in RAW264.7 cells	INTERNATIONAL JOURNAL OF MOLECULAR MEDICINE	21	291-296	2008
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Hata H, Kitamura T, Higashino F, Hida K, Yoshida K, Ohiro Y, Totsuka Y, Kitagawa Y, Shindo M	E1AF, an ets-oncogene transcription factor expression highly correlates with malignant phenotype of malignant melanoma through upregulating membrane-type-1 matrix proteinase gene	Oncol Rep	19	1093-1098	2008
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○Michiko TERADA, Shigeaki ABE, Tsukasa AKASAKA, Motohiro UO, Yoshimasa KITAGAWA and Fumio WATARI	Development of a Multiwalled Carbon Nanotube Coated Collagen Dish	Dent. Mater. J.	28	82-88	2008
Michiko Terada, Shigeaki Abe, Tsukasa Akasaka, Motohiro Uo, Yoshimasa Kitagawa and Fumio Watari	Multiwalled carbon nanotube coating on titanium	Bio-Medical Materials and Engineering		in press	2009
Yoshinori Kuboki, Michiko Terada, Yoshimasa Kitagawa, Shigeaki Abe, Motohiro Uo and Fumio Watari	Interaction of collagen triple-helix with carbon nanotubes: Geometric property of rod-like molecules	Biomed Mater Eng,		in press	2009

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J. George, Y. Kuboki, and T. Miyata,	Differentiation of mesenchymal stem cells into osteoblasts on honeycomb collagen scaffolds,	Biotech. Bioengineering	95	404- 411	2006,
Ichinohe N, Kuboki Y, Tabata Y	Bone regeneration using titanium nonwoven fabrics combined with FGF-2 release from gelatin hydrogel microspheres in rabbit defects,	Tissue Engineering	Part A, Oct; 14 (10):	1663- 171	2008
Fukui N, T, Kuboki Y, Aoki H.Kawakami T, Kuboki Y, Tanaka J, Hijikata S, akazawa T, Murata M, Fujisawa R, Takita H, Arisue M.	Bone tissue reaction of nano-hydroxyapatite /collagen composite at the early stage of implantation Regenerative medicine of bone and teeth – with special references to biological principles, problems and indicators.	Biomed Mater Eng. J Hard Tissue Biology	18 (1)16 (3)	25-33 2007	2008  95-11 3.
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Hirata I., Nomura Y., Ito M., Shimazu A. and Okazaki M	Acceleration of bone formation with BMP2 in frame-reinforced carbonate apatite-collagen sponge scaffolds.	J Artif Organs	10	212- 217,	2007
Hirata I., Okazaki M	Higher Concentrations of Fluoride Ions Dramatically Inhibit the Survival of Osteoblasts.	J Oral Tissue Engin	6	3-8	2008
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Y. Lee, Y. M. Hahm, Matsuya S, Nakagawa M, Ishikawa K	Characterization of macroporous carbonate-substituted hydroxyapatite bodies prepared in different phosphate solutions	Journal of Materials Science	42	7843-7849	2007
Xin Lin, Shigeki Matsuya, Masaharu Nakagawa, Yoshihiro Terada, Kunio Ishikawa	Effect of molding pressure on fabrication of low-crystalline calcite block	<i>Journal of Materials Science: Materials in Medicine</i>	19	479-484	2008
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S. Ohnuki, T. Yasuda, K. Yashiki, T. Suda, S. Watanabe	Dynamic and Static Hydrogen Effects on the Mechanical Properties in Vanadium Alloys Hydrogen in Matter	Second International Symposium on Hydrogen in Matter		132-138	2006
Yasuhiro Munekata, Kota Washio, Takanori Suda, Naoyuki Hashimoto, Somei Ohnuki, Hironobu Arashima and Hideaki Ito	Role of Annealing for Improving Hydrogen Storage Properties of T-Cr-V Alloy	Materials Research Society Symposium Proceedings	971	0971-207-21-26	2007
Koya Okudera, Koichi Hamada, Takanori Suda, Naoyuki Hashimoto, Somei Ohnuki, Yasuaki Kawai and Yoshitsugu Kojima	Development of Environmental Cell and its Application to Hydrogen Storage Materials	Materials Research Society Symposium Proceedings	971	0971-207-12-17	2007
○Koya Okudera, Koichi Hamada, Takanori Suda, Naoyuki Hashimoto, Somei Ohnuki	Development of Environmental Cell for Gas Reaction of Nano-size Particles	Advanced materials research	26-28	877-880	2007
S. Ohnuki, K. Okudera, K. Hamada, T. Suda, N. Hashimoto,	Observation of Hydrogen Strange Materials by Means of Environmental Cell TEM	International Symposium on Materials Design for Infrastructures, SICE2008 proceedings	6.,	pp.49-52	2008
A. Ono, H. Sitoh, S. Ohnuki, N. Hashimoto,	Micro-lamellar Structure in Hydrogen Storage Mg-Ni Alloys	Proceeding of 9th Asia-Pacific Microscopy Conference	7		2008

#### IV. 研究成果の刊行物・別刷

F. WATARI K. TOHJI K. ASAOKA

International Symposium on

**Nanotoxicology  
Assessment and  
Biomedical,  
Environmental  
Application  
of Fine Particles  
and Nanotubes  
ISNT2008**

June 16-17, 2008

Hokkaido University, Sapporo, Japan

Extended Abstracts  
of the International Symposium on  
**Nanotoxicology Assessment  
and Biomedical,  
Environmental Application of  
Fine Particles and Nanotubes**

**ISNT2008**

<http://sw2008.jp/nano>

in conjunction with  
G8 Hokkaido Toyako Summit 2008/  
Hokkaido University "Sustainability Weeks 2008"  
and Organization Meeting  
of the Nano Biomedical Society

June 16-17, 2008  
Conference Hall, Hokkaido University,  
Sapporo, Japan

## PREFACE

Health and environments are the major problems confronted in the 21st century. Efforts have been extensively done for the development of nanotechnology to exploit the new functions. Nanotechnology has made the most important contributions to realize the quality of life (QOL) in recent years. Drug Delivery System (DDS) is the typical example of biomedical applications of nanoparticles. Meanwhile the assessment of nanotechnology is the increasing concern. It may bring unexpectedly the hazard for health and environments, since both outcomes of profit and demerit would be expected by the enhancement effects of chemical reactivity due to nanosizing.

This Symposium (ISNT2008) intends to gather and discuss both biomedical application and risk assessment on the same stage and occasion. It follows the series of domestic symposiums held at Sendai (2005), Sapporo (2006), Sendai (2006), Tokyo (2007) and Nagoya (2007). This time the Symposium ISNT2008 is held during Hokkaido University "Sustainability Weeks 2008" <http://sw2008.jp/> in association with G8 Hokkaido Toyako Summit 2008 where the principal concern is environmental affairs in earth level. The 77 research presentations in all the aspects of biomedical, environmental and their related topics are collected, including

- (1) Biomedical applications of nano/micro structure and materials
- (2) Nanotoxicology and risk assessment of nano/micro particles such as carbon nanotubes, asbestos.
- (3) Environmental application and assessment of nano/micro particles including photocatalysts

We are grateful to all the contributors for the symposium, and also the institutions to provide the financial support.

Chairman of ISNT2008

Fumio WATARI

Biomedical, Dental Materials and Engineering,

Department of Oral Health Science,

Graduate School of Dental Medicine, Hokkaido University



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# Sapporo Campus MAP of Hokkaido University



- Main Gate
- Conference Hall
- Administration Bureau
- Health Administration Center
- Centennial Hall
- University Library
- Central Lawn
- Sakushukotani River
- Furukawa Hall
- Bust of Dr. William S. Clark
- Hokkaido University Co-op
- Clark Memorial Student Center
- International Student Center
- International House
- Graduate School of Agriculture
- Old Library (Research Center for North Eurasia and North Pacific Regions)
- Visitor Center
- Elm Grove
- Graduate School of Science
- The Hokkaido University Museum
- Graduate School of Economics and Business Administration
- Graduate School of Law
- Slavic Research Center
- Graduate School of Letters
- Graduate School of Education
- Graduate School of Environmental Earth Science
- Information Initiative Center
- College of Medical Technology
- Center for Instrumental Analysis
- Graduate School of Pharmaceutical Sciences
- Research Institute for Electronic Science
- Monument to First Artificial Snow
- Faculty House Trilium
- Poplar Avenue
- Field Science Center for Northern Biosphere
- Experimental Farms
- Meme Media Laboratory
- Research Center for Integrated Quantum Electronics
- Center for Advanced Research of Energy Conversion Materials

- Graduate School of Information Science and Technology
- Graduate School of Engineering
- Graduate School of Dental Medicine
- Dental Clinical Division of Hokkaido University Hospital
- Ginkgo Avenue
- Medical Clinical Division of Hokkaido University Hospital
- Graduate School of Medicine
- Institute for Genetic Medicine
- Central Institute of Radiosotope Science
- North Library
- Hokkaido University
- Multimedia Education Building
- Gym

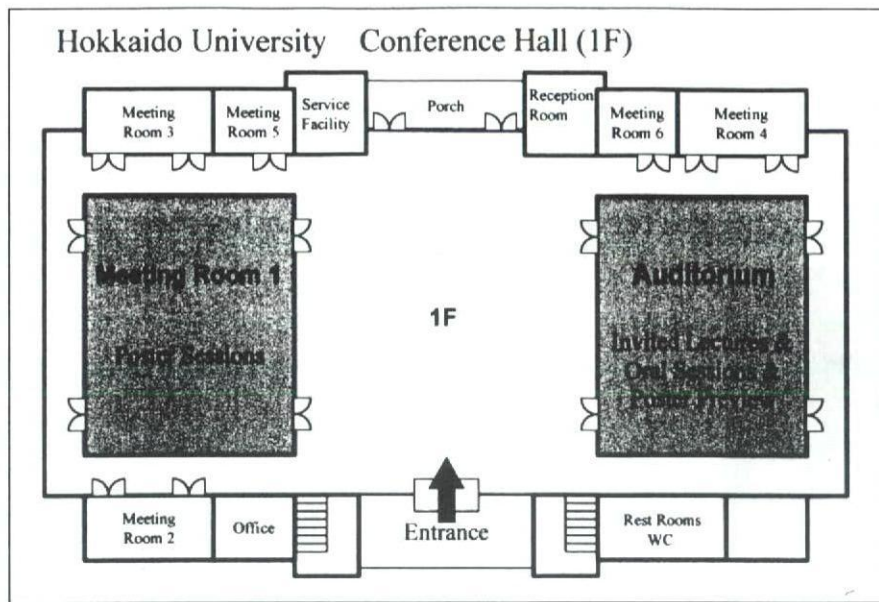
## Venue of ISNT2008

## Banquet Hotel Dynasty

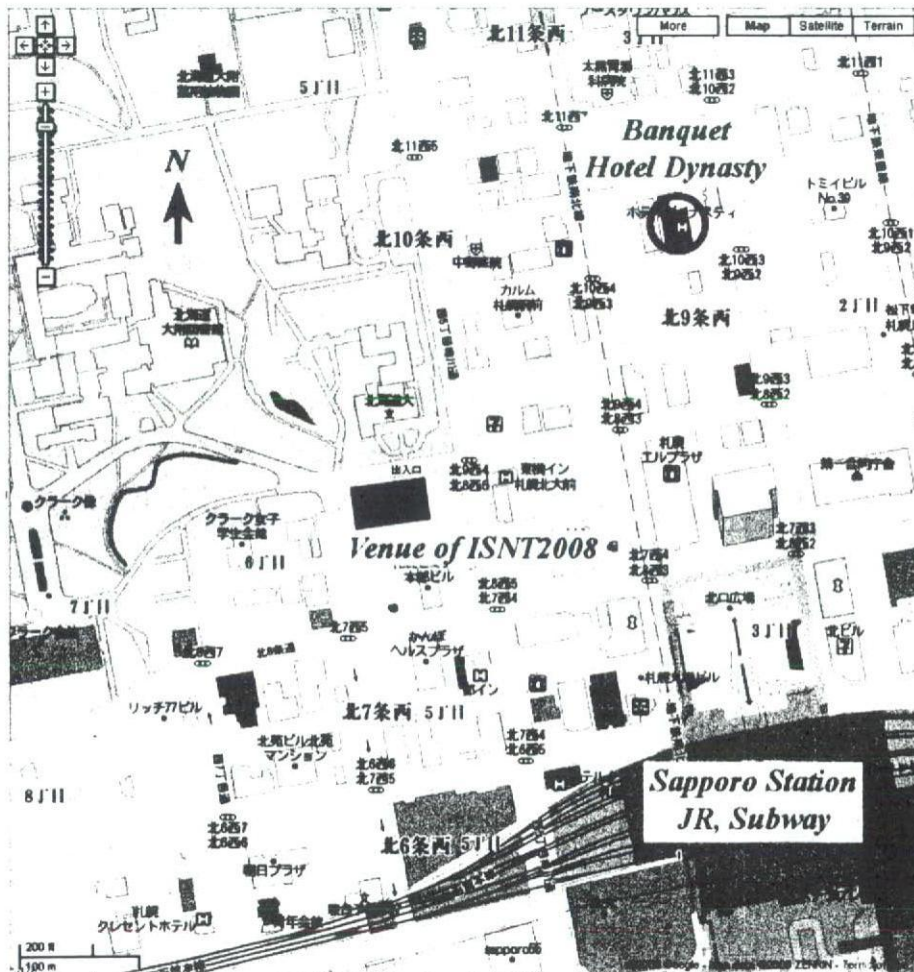
- Center for Research and Development in Higher Education
- Institute of Language and Culture Studies
- Graduate School of International Media and Communication
- Site of Old Village
- Physical Education Center
- Keiteki-Ryo (Student Dormitories)
- Veterinary Teaching Hospital
- Graduate school of Veterinary Medicine
- Enyuu Gakusha
- Model Barn
- Institute of Low Temperature Science
- Catalysis Research Center
- Creative Research Initiative "Sousei"
- Center for Advanced Science and Technology (CAST)
- Hokkaido Collaboration Center (Coloba Hokkaido)
- Foreign Scholar's Accommodation
- Botanical Garden

This is an image; there may be differences in the actual buildings.

## Map of Conference Hall



## Banquet: Hotel Dynasty (Start at 19:00 pm, June 16, 2008)



## **Invited Speakers:**

**(Invited-1) “Anti-bacterial Ceramics using Ag bearing Glaze”**



**Norifumi Isu  
General Research Institute of Technology  
INAX Corporation**

**(Invited-2) “Effective hydrogen generation using stratified type photocatalyst”**



**Hideyuki Takahashi  
Tohoku University  
Graduate School of Environmental Studies**

**(Invited-3) “Nanomaterial Applications of Functionalized Carbon Nanotubes”**



**Alberto Bianco  
CNRS, Institut de Biologie Moleculaire et Cellulaire  
Immunologie et Chimie Therapeutiques  
Strasbourg France**

**(Invited-4) “Microwave Hazard on Proteins Adsorbed on Carbon Nanotubes”**



**Masahito Sano  
Yamagata University  
Department of Polymer Science and Engineering**

**(Invited-5) “Novel Preparation Method of Environmental Catalysts  
and their Application”**



**Atsushi Muramatsu  
Tohoku University  
Institute of Multidisciplinary Research  
for Advanced Materials**

**(Invited-6) “Development of a second-generation radiofrequency  
ablation using sintered  $\text{MgFe}_2\text{O}_4$  needles and alternating  
magnetic field for human cancer therapy”**



**Yuji Watanabe  
Ehime University  
Graduate School of Medicine**

**(Invited-7) “Magnetic Drug Targeting”**



**Urs O. Häfeli  
University of British Columbia  
Faculty of Pharmaceutical Sciences**

## Young Researcher Travel Awardees

- (YR-1) “Characterization of Electrical Properties of HL-60 Cell Membrane by Rotating of Cells Uptake of Nanoparticles in A DEP Chip”  
Cheng-Hsin Chuang (Southern Taiwan University, Taiwan)
- (YR-2) “Electrode Arrays of Carbon Nanofibers for Biosensing at the Molecular and Cellular Level”  
Jessica Koehne (NASA Ames Research Center, USA)
- (YR-3) “Biomimetic Nerve Guidance Grafts: Synergism of Physical Nano-topography and Biochemical Guidance Cues”  
Hui Shan Koh (National University of Singapore, Singapore)
- (YR-4) “Identification and Assessment of the Effects of Engineered Nanoparticles on Brain Cells”  
Maria Iwe (Technical University Dresden, Germany)
- (YR, P1-003) “Fabrication and influence of heat treatment on nano-structured titanium oxide”  
Dr. Il Song Park (Chonbuk National University, Korea)
- (YR-5) “Injectable Biphasic Calcium Phosphate Bioceramic: the HYDROS? Concept”  
Serge Baroth (University of Nantes, France)
- (YR-6) “Designer Functionalized Self-assembling Peptide Nanofiber Scaffolds for the Growth, Migration, and Tubulogenesis of Human Umbilical Vein Endothelial Cells”  
Xiumei Wang (Tsinghua University, China)
- (YR-7) “Calcium Phosphate Nanoparticles for Cell Transfection”  
Ganna Kovtun (University of Duisburg-Essen, Germany)

**International Symposium on  
"Nanotoxicology Assessment and Biomedical, Environmental Application  
of Fine Particles and Nanotubes" (ISNT2008)**

**Program**

**Date: June 16-17, 2008, Place: Conference Hall, Hokkaido University, Sapporo, Japan**

**June 16 (Mon)**

**9:50-10:00 Opening Remark**

**10:00-11:00**

**(Oral 1-001) Advanced Preparation of Carbon Nanotube-Alumina Composite**

Mamoru Omori, Go Yamamoto, Toshio Hashida, Akira Okubo and Hisamichi Kimura (Tohoku University)

**(Oral 1-002) Chemical Imaging using Energy Filtered X-ray Photoemission Electron Microscopy**

Kiyotaka Asakura<sup>1</sup>, Takeshi Miyamoto<sup>1</sup>, Hironobu Niimi<sup>1</sup>, Shushi Suzuki<sup>1</sup> (Hokkaido University)

**(Oral 1-003) Formation of fine particles related with mechanical degradation of Ni-Ti superelastic alloys in biological fluids**

Kenzo Asaoka<sup>1</sup> and Motohiro Uo<sup>2</sup> (1. The University of Tokushima, 2. Hokkaido University)

**(Oral 1-004) Effect of temperature on crystallinity of carbonate apatite foam prepared from  $\alpha$ -tricalcium phosphate by hydrothermal treatment**

Akari Takeuchi<sup>1</sup>, Melvin L. Munar<sup>1</sup>, Hanae Wakae<sup>1</sup>, Shigeki Matsuya<sup>2</sup>, Kanji Tsuru<sup>1</sup>, and Kunio Ishikawa<sup>1</sup> (1. Kyushu University, 2. Fukuoka Dental College)

**(YR-1) Characterization of Electrical Properties of HL-60 Cell Membrane by Rotating of Cells Uptake of Nanoparticles in A DEP Chip**

Cheng-Hsin Chuang, Chen-Che Yeh (Southern Taiwan University)

**11:00-11:10**

**Coffee Break**

**11:10-11:50**

**(Invited-1) Anti-bacterial Ceramics using Ag bearing Glaze**

Norifumi Isu<sup>1</sup>, Yoshihiro Kato<sup>1</sup>, Satoru Yamazaki<sup>1</sup>, Atsushi Nakahira<sup>2</sup> and Chiya Numako<sup>3</sup> (1. INAX Corp., 2. Osaka Prefecture University, 3. The University of Tokushima)

**11:50-12:30**

**(Invited-2) Effective hydrogen generation using stratified type photocatalyst**

Hideyuki Takahashi (Tohoku University)

**12:30-13:30**

**Lunch**

**13:30-13:52**

**(Oral 1-005) Nanotechnology policy on health and environment in Japan: An international comparison**

Masami MATSUDA<sup>1</sup>, Geoffrey HUNT<sup>2</sup> (1. University of Shizuoka, 2. St Mary's University College)

**13:52-14:16**

**(Oral 1-006) Development of International Standard for measurement methods for the characterization of multi wall carbon nanotube**

Fuminori Munkane<sup>1</sup>, Kazuyoshi Furuta<sup>2</sup> (1. Nano Carbon Technologies Co., Ltd.)

**(Oral 1-007) Antimicrobial Activity of Fullerenes and Their Derivatives**

Hisae Aoshima<sup>\*1</sup>, Ken Kokubo<sup>2</sup>, Shogo Shirakawa<sup>2</sup>, Masayuki Ito<sup>1</sup>, Shuichi Yamana<sup>1</sup>, and Takumi Oshima<sup>2</sup> (1. Vitamin C60 BioResearch Corporation, 2. Osaka University)

**14:16-15:10**

**(Invited-3) Nanomedical Applications of Functionalized Carbon Nanotubes**

Alberto Bianco (CNRS, France)

**15:10-15:20**

**Coffee Break**

**15:20-16:20**

**(YR-2) Electrode Arrays of Carbon Nanofibers for Biosensing at the Molecular and Cellular Level**

Jessica Koehne<sup>1,4</sup>, Hua Chen<sup>2</sup>, Alan Cassell<sup>3</sup>, Gang-yu Liu<sup>4</sup>, Jun Li<sup>5</sup> and M. Meyyappan<sup>1</sup> (1. NASA Ames Research Center, 2. ELORET Corporation, 3. University of California Santa Cruz, 4. University of California Davis, 5. Kansas State University)

**(YR-3) Biomimetic nerve guidance grafts: Synergism of physical nano-topography and biochemical guidance cues**

Hui Shan Koh, Thomas Yong, Casey K Chan, Seeram Ramakrishna (National University of Singapore)

**(Oral 1-008) Gene expression analyses of human macrophage phagocytizing sub- $\mu$  titanium particles by allergy DNA chip (Genopal<sup>TM</sup>)**

M. TAIRA<sup>1</sup>, T. NEZU<sup>1</sup>, M. SASAKI<sup>2</sup>, S. KIMURA<sup>2</sup>, T. KAGIYA<sup>3</sup>, H. HARADA<sup>3</sup>, T. NARUSHIMA<sup>4</sup>, Y. ARAKI<sup>1</sup> (1,2,3. Iwate Medical University, 4. Tohoku University)

**(YR-4) Identification and assessment of the effects of engineered nanoparticles on brain cells**

M. Iwe<sup>1</sup>, A. Springer<sup>2</sup>, S. Bastian<sup>1</sup>, T. Meissner, A. Potthoff, V. Richter, H. Ikonomidou<sup>1</sup>, W. Pompe<sup>2</sup>, M. Gelinsky<sup>2</sup> (1. University Children's Hospital, 2. Technical University Dresden)

**(Oral 1-009) Unexpected immunological response against sterically stabilized, PEGylated, liposome after intravenous injection.**

Tatsuhiko Ishida and Hiroshi Kiwada (The University of Tokushima)



16:20-17:00

**(Invited-4) Microwave Hazard on Proteins Adsorbed on Carbon Nanotubes**

Masahito Sano (Yamagata University)

17:00-17:10

**Coffee Break**

17:10-17:52 (Poster Preview)

**(P1-001) Organic Synthesis of Aluminum Silicates and their property of water vapor adsorption**

Ryosuke Nakanishi<sup>1</sup>, Masaya Suzuki<sup>2</sup>, Keiichi Inukai<sup>1</sup>, Masaki Maeda<sup>1</sup> and Hideo Hashizume<sup>3</sup> (1. AIST Chubu, 2. AIST Tsukuba, 3. NIMS)

**(P1-002) Magnetic Nanoparticles for Magnetic Hyperthermia**

S. Aizawa, T. Hosono, Y. Sato, K. Tohji and B. Jeyadevan (Tohoku University)

**(P1-003, YR) Microstructure and Surface Characteristics of Anodized and Hydrothermal Treated Titanium**

IL SONG PARK<sup>1,2</sup>, MAN HYUNG LEE<sup>2</sup>, MIN HO LEE<sup>1</sup>, KYEONG WON SEOL<sup>2</sup>, TAE SUNG BAE<sup>2</sup>, FUMIO WATARI<sup>3</sup> (1,2. Chonbuk National University, 3. Hokkaido University)

**(P1-004) Synthesis and characteristics of silver sulfide stratified photocatalyst**

Yohei Baba, Tsugumi Hayashi, Toshiharu Taga, Hideyuki Takahashi, and Kazuyuki Tohji (Tohoku University)

**(P1-005) poly(Arg) - nanoparticle complexes translocate through lipid bilayer membranes**

Satoru Ueno, Saburo Shimabayashi (The University of Tokushima)

**(P1-006) Accelerated blood clearance (ABC) phenomenon on PEGylated nanocarriers: Unexpected immune-reaction against PEGylated liposomes**

Taro Shimizu, Kosuke Nawata, Tatsuhiro Ishida, Hiroshi Kiwada (The University of Tokushima)

**(P1-007) Effect of Lubricant on Wear Debris of Ultra High Molecular Weight Polyethylene Cups against Zirconia's Balls in Hip Joint Simulator**

Masami Hashimoto, Mineo Mizuno and Satoshi Kitaoka (Japan Fine Ceramics Center)

**(P1-008) Genotoxicity of nanoparticles in *in vivo* mutation assay systems**

Yukari Totsuka<sup>1</sup>, Takamichi Ichinose<sup>2</sup>, Kyoko Hiyoshi<sup>3</sup>, Tatsuya Kato<sup>4</sup>, Shuichi Masuda<sup>4</sup>, Takehiko Nohmi<sup>5</sup>, Takashi Sugimura<sup>1</sup>, Keiji Wakabayashi<sup>1</sup> (1. National Cancer Center Research Institute, 2. Oita University of Nursing and Health Sciences, 3. School of Nursing, 4. University of Shizuoka, 5. National Institute of Health Sciences)

**(P1-009) How small aggregates must be prepared in an *in vitro* safety evaluation system for nanomaterials?**

Atsuko Matsuoka<sup>1</sup>, Yoshie Matsuda<sup>1</sup>, Ryusuke Nakaoka<sup>1</sup>, Yuji Haishima<sup>1</sup>, Masako Yudasaka<sup>2</sup>, Sumio Iijima<sup>3</sup>, and Toshie Tsuchiya<sup>1</sup> (1. National Institute of Health Sciences, 2. AIST Nanotube Research Center, 3. Meijo University)

**(P1-010) Imaging of biodistribution of organic- / inorganic- particles in mice**

Shigeaki Abe<sup>1</sup>, Chika Koyama<sup>1</sup>, Tsukasa Akasaka<sup>1</sup>, Motohiro Uo<sup>1</sup>, Yoshinori Kuboki<sup>1,2</sup>, and Fumio Watari<sup>1</sup> (1. Hokkaido University, 2. Koken Bioscience Institute)

**(P1-011) Assessment of allergic hypersensitivity to dental materials**

M. Hosoki, E. Bando, K. Asaoka, M. Kitamura, H. Takeuchi, and K. Nishigawa (The University of Tokushima)

**(P1-012) Nano-micro Mapping Analysis of Human Bone Integrated with Orthodontic Midpalatal Implant**

Masaru Murata<sup>1</sup>, Toshiyuki Akazawa<sup>2</sup>, Toshihiro Yuasa<sup>1</sup>, Miki Okayama<sup>1</sup>, Junichi Tazaki<sup>1</sup>, Takao Hanawa<sup>3</sup>, Makoto Arisue<sup>1</sup> and Itaru Mizoguchi<sup>1</sup> (1. Health Sciences University of Hokkaido, 2. Hokkaido Industrial Research Institute, 3. Tokyo Medical and Dental University)

**(P1-013) The effect of nanohydroxyapatite-collagen composite tape by BMP-2 application**

Taichi Tenkumo, Tsutomu Sugaya, Masamitsu Kawanami (Hokkaido University)

**(P1-014) Cell adhesion to CNT coated silicone rubber**

Makoto Matsuoka<sup>1</sup>, Tsukasa Akasaka<sup>1</sup>, Takeshi Hashimoto<sup>2</sup>, Yasunori Totsuka<sup>1</sup>, Fumio Watari<sup>1</sup> (1. Hokkaido University, 2. Meijo Nano Carbon Co., LTD.)

**(P1-015) Cell Culture on Imogolite Scaffold**

Kosuke Ishikawa<sup>1</sup>, Masayuki Kaga<sup>1</sup>, Tsukasa Akasaka<sup>2</sup>, Yasutaka Yawaka<sup>1</sup>, Masaya Suzuki<sup>3</sup>, Fumio Watari<sup>2</sup> (1,2. Hokkaido University, 3. AIST)

**(P1-016) Evaluation of Waveform-like Pattern of Cell Proliferations on Self-Assembled Monolayers with a Series of Surface Composition Changes**

I. Hirata and M. Okazaki (Hiroshima University)

**(P1-017) Biocompatibility of binder-free multi-walled carbon nanotube blocks cross-linked by de-fluorination against subcutaneous tissue of rats *in vivo***

Yoshinori Sato<sup>1</sup>, Atsuro Yokoyama<sup>2</sup>, Takao Kasai<sup>2</sup>, Shin-ichi Ogino<sup>1</sup>, Naoki Sashida<sup>1</sup>, Shinji Hashiguchi<sup>3</sup>, Balachandran Jeyadevan<sup>3</sup>, Kazuyuki Tohji<sup>3</sup> (1. Tohoku University, 2. Hokkaido University, 3. Stella Chemifa Co.)

**(P1-018) Development of multi walled carbon nanotubes coated collagen for cell culturing**

Michiko Terada, Motohiro Uo, Yoshimasa Kitagawa and Fumio Watari (Hokkaido University)

**(P1-019) Low-voltage and high-voltage TEM observations on CNT of rat *in vivo***

N. Sakaguchi<sup>1</sup>, F. Watan<sup>2</sup>, A. Yokoyama<sup>2</sup>, Y. Nodasaka<sup>2</sup> and H. Ichinose<sup>3</sup> (1,2. Hokkaido University, 3. Riken)

**(P1-020) Carbon nanotubes incorporate into cell structure; a novel pathway for nanotubes detoxification in plants**

Maged Fouad, Noritada kaji, Mohamad Jabasini, Manabu Tokeshi and Yoshinobu Baba (Nagoya University)

**(P1-021) Human Osteosarcoma Cell Adhesion onto Carbon Nanotube Sheets**

Tsukasa Akasaka<sup>1</sup>, Atsuro Yokoyama<sup>1</sup>, Makoto Matsuoka<sup>1</sup>, Takeshi Hashimoto<sup>2</sup>, Shigeaki Abe<sup>1</sup>, Motohiro Uo<sup>1</sup>, Fumio Watari<sup>1</sup> (1. Hokkaido University, 2. Meijo Nano Carbon Co., LTD.)

17:52-18:40

**Poster Discussion**

19:00-21:00 Banquet (at Hotel Dynasty)

## June 17 (Tue)

9:00-10:00

**(Oral 2-001) Application of Nano-crystal CO<sub>3</sub>Ap as Hard Tissue Scaffold Biomaterials**

M. Okazaki and I. Hirata (Hiroshima University)

**(Oral 2-002) Microstructure Design of Biomimetic and Functionally Graded Hydroxyapatite by Calcination and Partial Dissolution-Precipitation Methods**

Toshiyuki Akazawa<sup>1</sup>, Masaru Murata<sup>2</sup>, Junichi Tazaki<sup>2</sup>, Katsuo Nakamura<sup>1</sup>, Jun Hino<sup>2</sup>, Masaya Yamamoto<sup>3</sup> and Yasuhiko Tabata<sup>3</sup> (1. Hokkaido Industrial Research Institute, 2. Health Sciences University of Hokkaido, 3. Kyoto University)

**(YR-5) Injectable Biphasic calcium phosphate bioceramic: the HYDROS® concept**

Baroth S.<sup>1,2</sup>, Bourges X.<sup>1</sup>, Goyenville E.<sup>2</sup>, Aguado E.<sup>3</sup>, Daculsi G.<sup>2</sup> (1. Biomatlante SAS, 2. University of Nantes, 3. LBBTO Veterinary School Nantes)

**(Oral 2-003) Assessment of nanostructure of "Super Dentin" formation by application of all-in-one adhesive systems**

Toru Nikaido, Dinesh D. S. Weerasinghe, Go Inoue and Junji Tagami (Tokyo Medical and Dental University)

**(Oral 2-004) Improved bond performance of dental adhesive system using nano-technology**

Futami Nagano<sup>1</sup>, Denis Selimovic<sup>2</sup>, and Hidehiko Sano<sup>1</sup> (1. Hokkaido University, 2. Louis Pasteur University)

10:00-10:40

**(Invited-5) Novel Preparation Method of Environmental Catalysts and their Application**

Atsushi Muramatsu (Tohoku University)

10:40-10:55

Coffee Break

10:55-11:43

**(Oral 2-005) Comparative Studies of Carbon Nanofiber Cytotoxicity on Young and Senescent cells of *Paramecium***

Nobuyuki Haga, Taiki Abe and Koichi Haneda (Ishinomaki Senshu University)

**(Oral 2-006) Studies of *Paramecium caudatum* by Means of Scanning Electron Microscope and Projection X-Ray Microscope**

Keiji Yada, Taiki Abe and Nobuyuki Haga (1. Tohken CO., LTD, 2. Ishinomaki Senshu University)

**(YR-6) Designer Functionalized Self-assembling Peptide Nanofiber Scaffolds for the Growth, Migration, and Tubulogenesis of Human Umbilical Vein Endothelial Cells**

Xiumei Wang<sup>1</sup>, Shuguang Zhang<sup>2</sup> (1. Tsinghua University, 2. Massachusetts Institute of Technology)

**(Oral 2-007) Modification of porphyrin precursor 5-ALA with TiO<sub>2</sub> particles by ultrasound irradiation in vitro and treatment of the administrated cancer model by ultrasound in vivo**

Norio Miyoshi<sup>1</sup>, Yukihiko Fukunaga<sup>1</sup>, Toshiyuki Ogasawara<sup>2</sup>, Hidetaka Kinoshita<sup>2</sup>, Tsuyoshi Miyasaka<sup>3</sup>, and Haruo Hisazum<sup>4</sup> (1,2. University of Fukui, 3. Toin University of Yokohama)

11:43-12:23

**(Invited-6) Development of a second-generation radiofrequency ablation using sintered MgFe<sub>2</sub>O<sub>4</sub> needles and alternating magnetic field for human cancer therapy**

Yuji Watanabe, Koichi Sato, Shungo Yukumi, Motohira Yoshida, Yuji Yamamoto, Yuji Doi, Takashi Naohara, Tsunehiro Maehara, Hiromichi Aono, Kanji Kawachi (Ehime University)

12:23-13:30

Lunch

13:30-13:54

**(Oral 2-008) Possibility of Drug Delivery System (DDS) with ability of collagen fiber formation**

Kikuji Yamashita<sup>1</sup>, Akemichi Ueno<sup>2</sup>, Tatsuo Ishikawa<sup>1</sup>, Kaori Sumida<sup>1</sup>, Kaori Abe<sup>1</sup> and Seiichiro Kitamura<sup>1</sup> (1. University of Tokushima, 2. Ohu University)

**(YR-7) Calcium phosphate nanoparticles for cell transfection**

Anna Kovtun, Matthias Epple (University of Duisburg-Essen)

13:54-14:50

**(Invited-7) Magnetic Drug Targeting**

Urs O. Häfeli (University of British Columbia)

14:50-15:00

Coffee Break

15:00-15:44 (Poster Preview)

**(P 2-001) In-situ observation of Ag nanoparticles at high temperature**

Tetsu Yonezawa (The University of Tokyo)

**(P 2-002) Fabrication and influence of heat treatment on nano-structured titanium oxide**

Madhav Prasad Neupane<sup>1</sup>, Kim Yu Kyoung<sup>1</sup>, Il Song Park<sup>2</sup>, Min Ho Lee<sup>2\*</sup>, Tae Sung Bae<sup>2</sup>, Fumio Watari<sup>3</sup> (1. Chonbuk National University, 2. Chonbuk National University, 3. Hokkaido University)

**(P 2-003) Synthesis of core-shell type ZnS-CdS photocatalyst with the stratified morphology**

Tsugumi Hayashi, Yohei Baba, Toshiharu Taga, Hideyuki Takahashi and Kazuyuki Tohji (Tohoku University)

**(P 2-004) Heat diffusion characteristics of magnetite nanoparticles in AC magnetic field**

M. Suto, H. Kosukegawa, K. Maruta, M. Ohta, K. Tohji and B. Jeyadevan (Tohoku University)

**(P 2-005) Multi-wall Carbon Nanotubes Monolith prepared by Spark Plasma Sintering (SPS) and its mechanical property**

Motohiro Uo<sup>1</sup>, Tsukasa Akasaka<sup>1</sup>, Isao Tanaka<sup>2</sup>, Fuminori Mune Kane<sup>3</sup>, Mamoru Omori<sup>4</sup>, Hisamichi Kimura<sup>3</sup> and Fumio Watari<sup>1</sup> (1. Hokkaido University, 2. Shimizu Cooperation, 3. Nano Carbon Technologies Co., Ltd, 4. Tohoku University)

**(P 2-006) Fabrication and mechanical and biological properties of porous chitosan/ HAp nanocomposites**

Haruhiko Kashiwazaki<sup>1</sup>, Yusuke Kishiya<sup>1</sup>, Keisuke Yamaguchi<sup>1</sup>, Tadashi Iizuka<sup>2</sup>, Junzo Tanaka<sup>3</sup>, Nobuo Inoue<sup>1</sup> (1,2. Hokkaido University, 3. Tokyo Institute of Technology)

- (P 2-007) **Chemical Modification of Carbon Nanotubes and Their Use in Adhesive Interaction Force Measurements Using an Atomic Force Microscope**  
Hiroaki Azebara, Koichiro Ide and Hiroshi Tokumoto (Hokkaido University)
- (P 2-008) **An Anionic Dendrimer as a Model for Acidic Matrix Proteins of Bone and Tooth**  
Ryuichi Fujisawa, Morimichi Mizuno, Masato Tamura (Hokkaido University)
- (P 2-009) **VOC removal activity of fired scallop shell: assignment of effective component**  
Tomoya Takada, Atsushi Furusaki, Yasuaki Tanaka (Asahikawa National College of Technology)
- (P 2-010) **A Novel Prosthetic Resin Composite containing Fine Enamel Filler Particles**  
Kazuhiko Endo and Hiroki Ohno (Health Sciences University of Hokkaido)
- (P 2-011) **Modification of Dentin Surface by Coating of Carbon Nanotubes**  
Tsukasa Akasaka<sup>1</sup>, Keiko Nakata<sup>2</sup>, Motohiro Uo<sup>3</sup>, and Fumio Watari<sup>1</sup> (1. Hokkaido University, 2. Tokyo Medical and Dental University)
- (P 2-012) **Destruction of HIV and Growth Restriction of Cancer Cell by Nano-Hydroxyapatite**  
Hideki Aoki and Tatsuhiko Yajima (Saitama Institute of Technology)
- (P 2-013) **Preparation of mono-dispersed carbon nanotubes for exposure and risk assessment experimental studies**  
Bunshi Fugetsu and Fumio Watari (Hokkaido University)
- (P 2-014) **Distribution imaging of magnetic particles in mice compared with magnetic resonance imaging and X-ray scanning analytical microscope**  
Mitsue Esaki<sup>1</sup>, Shigeaki Abe<sup>2</sup>, Tsukasa Akasaka<sup>1</sup>, Motohiro Uo<sup>1</sup>, Manabu Morita<sup>2</sup>, Toshiaki Hosono<sup>3</sup>, Yoshinori Sato<sup>3</sup>, Balachandran Jeyadevan<sup>3</sup>, Yoshinori Kuboki<sup>1,4</sup>, Kazuyuki Tohji<sup>2</sup>, Fumio Watari<sup>1</sup> (1. Hokkaido University, 2. Okayama University, 3. Tohoku University, 4. Koken Bioscience Institute)
- (P 2-015) **Microstructure and biological influence of environmental exposure of asbestos**  
Keiji Yada<sup>1</sup> and Norihiko Kohyama<sup>2</sup> (1. Tohken Co., LTD, 2. Toyo University)
- (P 2-016) **New geometrical matrix for bone regeneration: a honeycomb-shaped  $\beta$ -TCP ceramics induced straight longitudinal bone inside the tunnels**  
Michiko Terada<sup>1</sup>, Shouhei Iku<sup>2,3</sup>, Yoshimasa Kitagawa<sup>1</sup>, Mariko Takayama<sup>4</sup>, Tohru Kaku<sup>5</sup>, Motohiro Uo<sup>1</sup>, Fumio Watari<sup>1</sup> and Yoshinori Kuboki<sup>1</sup> (1. Hokkaido University, 2. Xinxiang Medical University, 3. Pilot Precision, 4. Health Sciences University of Hokkaido)
- (P 2-017) **Enhanced osteoinduction by controlled release of bone morphogenetic protein-2 from Hydroxyapatite and  $\beta$ -tricalcium phosphate**  
Junichi Tazaki<sup>1</sup>, Masaru Murata<sup>1</sup>, Toshiyuki Akazawa<sup>2</sup>, Masaya Yamamoto<sup>3</sup>, Yasuhiko Tabata<sup>3</sup>, Katsutoshi Ito<sup>1</sup>, Makoto Arisue<sup>1</sup> and Takanori Shibata<sup>1</sup> (1. Health Sciences University of Hokkaido, 2. Hokkaido Industrial Research Institute, 3. Kyoto University)
- (P 2-018) **Geometric property of rod-like molecules: Interaction mechanism of collagen triple-helix with carbon nanotubes**  
Yoshinori Kuboki, Michiko Terada, Yoshimasa Kitawawa, Shigeaki Abe, Motohiro Uo and Fumio Watari (Hokkaido University)
- (P 2-019) **Multi-walled carbon nanotube blocks cross-linked by de-fluorination**  
Sashida Naoki<sup>1</sup>, Yoshinori Sato<sup>1</sup>, Masaru Namura<sup>1</sup>, Shinji Hashiguchi<sup>2</sup>, Kenichi Motomiya<sup>1</sup>, Balachandran Jeyadevan<sup>1</sup>, Kazuyuki Tohji<sup>1</sup> (1. Tohoku University, 2. Stella Chemifa Co.)
- (P 2-020) **Maturation of osteoblast-like SaoS2 induced by carbon nanotubes**  
Xiaoming Li<sup>1</sup>, Hong Gao<sup>2</sup>, Motohiro Uo<sup>1</sup>, Yoshinori Sato<sup>1</sup>, Tsukasa Akasaka<sup>1</sup>, Shigeaki Abe<sup>1</sup>, Qingling Feng<sup>4</sup>, Fuzhai Cui<sup>4</sup>, Fumio Watari<sup>1</sup> (1,2. Hokkaido University, 3. Tohoku University, 4. Tsinghua University)
- (P 2-021) **The difference of the effect of multi-walled carbon nanotubes on human hepatic normal and cancer cells**  
Sachiko Itoh, Yasutaka Yawaka, Tsukasa Akasaka, Fumio Watari (Hokkaido University)
- (P 2-022) **Multi wall carbon nanotube coating of 3D collagen cell culture scaffold**  
Eri Hirata, Motohiro Uo, Hiroko Takita, Tsukasa akasaka, Fumio Watari, Atsuro Yokoyama (Hokkaido University)
- (P 2-023) **Establishment of a novel antisense-oligonucleotide therapy using a natural DNA carrier molecule and its effectiveness on murine model of arthritis**  
Shin Onodera<sup>1</sup>, Harukazu Tohyama<sup>1</sup>, Kazunori Yasuda<sup>1</sup>, Yoshikazu Koyama<sup>2</sup>, Atsushi Uno<sup>3</sup>, Hironori Ando<sup>4</sup>, and Kazuo Sakurai<sup>5</sup> (Hokkaido University, Hokkaido Information University, Napa Jenomics, the University of Kitakyusyu)

15:44-16:50

Poster Discussion

16:50-17:26

(Oral 2-009) **Application of Platinum Nanomaterials for SALDI-MS**

Tetsu Yonezawa<sup>1</sup>, Hideya Kawasaki<sup>2</sup> and Ryuichi Arakawa<sup>2</sup> (1. The University of Tokyo, 2. Kansai University)

(Oral 2-010) **Size dependence of interaction of materials with cells and tissue**

Fumio Watari, Shigeaki Abe, Eri Hirata, Atsuro Yokoyama, Tsukasa Akasaka, Motohiro Uo, Makoto Matsuoka, Noriyuki Takashi, Yasunori Totsuka, Kosuke Ishikawa, Sachiko Itoh, Yasutaka Yawaka (Hokkaido University)

(Oral 2-011) **Geometry of artificial ECM: Parallel inductions of bone and vasculature within the tunnels of honeycomb-shaped beta-tricalcium phosphate ceramics *in vivo***

Yoshinori Kuboki<sup>1</sup>, Shouhei Iku<sup>2,3</sup>, Michiko Terada<sup>1</sup>, Yoshimasa Kitawawa<sup>1</sup>, Mariko Takayama<sup>3</sup>, Makiko Kono<sup>2</sup>, Yu Aso<sup>2</sup>, Tohru Kaku<sup>5</sup>, Motohiro Uo<sup>1</sup> and Fumio Watari<sup>1</sup> (1. Hokkaido University, 2. Koken Bioscience Institute, 3. Xinxiang Medical University, 4. Pilot-Corporation Co., 5. Health Science University of Hokkaido)

17:26-17:30

Ending Remark

## Advanced Preparation of Carbon Nanotube-Alumina Composite

Mamoru Omori<sup>1</sup>, Go Yamamoto<sup>1</sup>, Toshio Hashida<sup>1</sup>, Akira Okubo<sup>2</sup>  
and Hisamichi Kimura<sup>2</sup>

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Aoba-ku, Sendai 980-8579 (Japan)

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### 1. Introduction

Hard and stable ceramics have been claimed for matrix of carbon nanotube (CNT) composite compared with polymers. Various kinds of CNT-ceramics composites have been synthesized since 1997. All these composites did not achieve the strength which indicated the possibility for industrial application. This low strength is possibly related to starting materials of composite.

There is a question if ceramics powder is adequate for fabrication of CNT-ceramics composite. Some of precursors of ceramics can be transformed into ceramics crystal by heating. It is an attempt to apply the precursor to starting ceramics of composite. One of precursors of alumina is aluminum hydroxide ( $\text{Al}(\text{OH})_3$ ). There is two kind of multi-walled carbon nanotube (MWCNT) distinguished from thickness of graphen (graphite sheet). One is thin multi-walled carbon nanotube (thin-MWCNT). Another is thick multi-walled carbon nanotube (thick-MWCNT).

In this paper, CNT-alumina composite was prepared from  $\text{Al}(\text{OH})_3$  and the two types of MWCNT. It was found that selection of MWCNTs was seriously important for fabrication of an advanced composite.

### 2. Experimental Procedure

Thin-MWCNT was supplied by NanoLab Cop., Ltd. (USA) and used after removing amorphous carbon and metals. Thick-MWCNT was produced by Nanocarbon Technologies Co., Ltd. (Japan) and its purity was more than 99%. These MWCNTs and  $\text{Al}(\text{OH})_3$  (Wako Chemicals) were mixed in water slurry.  $\text{SiO}_2 \cdot n\text{H}_2\text{O}$  (Wako Chemicals) of 1wt% was added to prevent grain growth of alumina. The dried mixture was sintered by the spark plasma sintering (SPS) method. Density, Young's modulus, bending strength and fracture toughness were determined by conventional tests.

### 3. Results and discussion

Almost all composites have been prepared from thin-MWCNT and not resulted in industrial application. Thick-MWCNT has rarely used for composite formation because it was not popular. There was great difference between the properties of the composites prepared thin-MWCNT and thick-MWCNT. Density, Young's modulus, bending strength and fracture toughness of the thick-MWCNT composite were higher than those of the thin-MWCNT composite. The two composites were consisted of the coagulated cluster of MWCNT dispersed in the alumina matrix. The clusters of thin-MWCNT did not contain alumina crystals and was porous. On the other hand, the clusters of thick-MWCNT were composed of itself and alumina nanocrystals and contributed to the high density and strength. Aluminum hydroxide went into the thick-MWCNT cluster and turned to alumina nanocrystal, but it did not go into the thin-MWCNT cluster. The coagulate force of thin-MWCNT cluster was stronger than that of thick-MWCNT and prevent entrance of aluminum hydroxide. The alumina nanocrystal and thick-MWCNT cluster made a nanocomposite dispersed in the alumina matrix. The nanocomposite was not porous and did not lower the strength of the composite.