



Strasbourg (France)

E-MRS Spring Meeting 2004
May 24-28, 2004

SYMPOSIUM R

Nano-composites for space and infrastructure
applications

Symposium Organizers:

Kin-tak Lau, The Hong Kong Polytechnical University, China

Andrew D. Nurse, Loughborough University, U.K.

Stan Veprek, Technical University of Munich, Germany

Tibor Cselle, PLATIT AG, Switzerland

Papers will be published in Composites Science and Technology

E-MRS 2004 SPRING MEETING

SYMPOSIUM R

Tuesday, May 25, 2004

Morning

Session I: Nanotube/polymer composites

Session chairs: Kin-tak Lau and Stan Veprek

- R-I.1** 08:30 -Invited- NANOCOMPOSITE AND NANOSTRUCTURED TRIBOLOGICAL MATERIALS FOR SPACE APPLICATIONS
A.A. Voevodin and J.S. Zabinski, Air Force Research Laboratory, Materials and Manufacturing Directorate, Wright Patterson Air Force Base OH 45433-7750, USA
- R-I.2** 09:00 POLYIMIDE/CARBON NANOTUBE COMPOSITE FILMS FOR SPACE APPLICATIONS
Donovan M. Delozier, Kent A. Watson, Joseph G. Smith Jr. and John W. Connell, National Aeronautics and Space Administration, Langley Research Center, Hampton VA 23681-2199, USA
- R-I.3** 09:20 A STUDY ON NI/P/CARBON NANOTUBES NANOCOMPOSITE COATINGS AND THEIR PROPERTIES
Hu-Lin Li, Zhi Yang, Hui Xu, Yan-Li Shi, Mei Lu, Department of Chemistry, Lanzhou University, Lanzhou 730000, China
- R-I.4** 09:40 ELECTROMECHANICAL CONSTITUTIVE EQUATIONS OF CARBON NANOTUBE ACTUATORS FILLED WITH CONDUCTIVE POLYMER
Cheol Kim and J.T. Kim, Department of Mechanical Engineering, Kyungpook National University, Korea
- R-I.5** 10:00 PROCESSING OF CARBON NANOTUBE REINFORCED SILICON NITRIDE COMPOSITES BY SPARK PLASMA SINTERING
Cs. Balázs(a), Z. Shen(b), Z. Kónya(c), Zs. Kasztovszky(d), F. Wéber(a), Z. Vértesy(e), L.P. Birò(f), I. Kiricsi(c), P. Arat(a), (a)Ceramics and Refractory Metals Laboratory, Research Institute for Technical Physics and Materials Science, Budapest, Hungary, (b)Stockholm University, Arrhenius Laboratory, Department of Inorganic Chemistry, 10691 Stockholm, Sweden, (c)Department of Applied and Environmental Chemistry, University of Szeged, Rerrich Béla tér 1, 6720 Szeged, Hungary, (d)Department of Nuclear Research, Institute of Isotope and Surface Chemistry, Chemical Research Center, Budapest, Hungary, (e)Magnetooptics and Diagnostics Laboratory, Research Institute for Technical Physics and Materials Science, Budapest, Hungary, (f)Laboratory for Nanostructures Research, Research Institute for Technical Physics and Materials Science, Budapest, Hungary
- 10:20 **BREAK**

Session II: Nanotube/polymer composites

Session chairs: Andrew D. Nurse and Kin Liao

- R-II.1** 11:00 -Invited- GLASS TRANSITION BEHAVIOUR OF SILICA/POLYSTYRENE NANOCOMPOSITES
Amitabh Bansal, Hoichang Yang, Chang Y. Ryu, Linda Schadler, Dept. of Materials Science and Engineering, Rensselaer Nanotechnology Center, Dept. of Chemistry, Rensselaer Polytechnic Institute, USA
- R-II.2** 11:30 CHEMICAL BONDING BEHAVIOUR OF SWNTS-ECPS COMPOSITES
Hu-Lin Li, Zhe Wang, Bo Wang, College of Chemical and Engineering, Lanzhou University, Lanzhou 730000. China, Lanzhou institute of Chemical physics, Academic institute of Science, 730000 Lanzhou, China
- R-II.3** 11:50 SINGLE-WALLED CARBON NANOTUBE / POLYMER COMPOSITES: RHEOLOGY AND THERMAL PROPERTIES
Karen I. Winey, Fangming Du, Jennifer R. Lukes, John E. Fischer, University of Pennsylvania, Philadelphia, USA
- R-II.4** 12:10 FATIGUE FAILURE MECHANISMS OF SINGLE-WALLED CARBON NANOTUBE ROPES
Y. Ren(a), T. Xiao(b), Y.Q. Fu(a), F. Li(c), H. M. Cheng(c) and **K. Liao**(a), (a)School of Mechanical and Production Engineering, (b)School of Electrical and Electronics Engineering, Nanyang Technological University, Singapore 639798, (c)Shenyang National Laboratory for Materials Science, Institute of Metal Research, Chinese Academy of Sciences, 72 Wenhua Road, Shenyang 110016, China
- R-II.5** 12:30 EFFECT OF SOLVENT SELECTION FOR CARBON NANOTUBES DISPERSION ON THE MECHANICAL PROPERTIES OF EPOXY-BASED NANOCOMPOSITES
Mei Lu, Kin-tak Lau, Hang-yin Ling and Hu-Lin Li, Department of Mechanical Engineering, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong
- 12:50 **LUNCH**

Tuesday, May 25, 2004

Afternoon

Session III: Synthesis and characterization of nano-materials

Session chairs: Jorg Patscheider and Stan Veprek

- R-III.1** 14:00 -Invited- SUCCESS OF NANOSTRUCTURED COATINGS PREPARED BY NOVEL ARC TECHNOLOGY
Pavel Holubar, SHM, s.r.o., Czech Republic, Tibor Cselle, PLATIT AG, Switzerland, Mojmir Jilek, SHM, s.r.o., Czech Republic, Marcus Morstein, PLATIT AG, Switzerland
- R-III.2** 14:30 NANO-ALUMINUM AS A FILLER FOR SOLID PROPELLANTS
G.L. Marra, L. Meda, Ist. Donegani Polimeri Europa, via Fauser 4, 28100 Novara, Italy and L. De Luca, L. Galfetti, F Severini, Politecnico di Milano, Solid Propulsion Laboratory, 20158 Milano, Italy
- R-III.3** 14:50 CONTROL OF THE NITROGEN CONTENT IN NANO-COMPOSITE TiN/SiNx COATINGS DEPOSITED BY AN ARC-SPUTTER HYBRID PROCESS
F.-J. Haug, J. Patscheider, Swiss Federal Laboratories for Material Testing and Research (EMPA), Surfaces, Coatings, and Magnetism, Überlandstrasse 129, 8600 Dübendorf, Switzerland and M. Tobler, Ionbond AG, Industriestrasse 21, 4600 Olten, Switzerland
- R-III.4** 15:10 MULTI-FUNCTIONAL POLYMER NANOCOMPOSITES FOR SPACE APPLICATIONS
Zoubeida Ounaies, Cheol Park, Kris Wise, Joycelyn Harrison, Virginia Commonwealth University, National Institute of Aerospace, NASA Langley Research Centre
- R-III.5** 15:30 FABRICATION AND THE MICROSTRUCTURE OF NANOCOMPOSITE TI(C,N)-BASED CERMET PREPARED BY SPARK PLASMA SINTERING
Yong Zheng, Shengxiang Wang, Wenjun Liu, Quan Yuan, College of Mechanical and Materials Engineering, China Three Gorges University, Yichang 443002, P.R. China
- R-III.6** 15:50 MANUFACTURING AND MECHANICAL RESPONSE OF NANOCOMPOSITE LAMINATES
Ming-Hwa R. Jen, Yu-Chung Tseng, Chun-Hsien Wu, Dept. of Mechanical and Electro-Mechanical Engineering, National Sun Yat-Sen University, Kaohsiung, Taiwan 80424, ROC
- 16:10 **BREAK**

Session IV: Synthesis and characterization of nano-materials

Session chairs: Jang-Kyo Kim and Stan Veprek

- R-IV.1** 16:30 -Invited- TRIBOLOGICAL PERFORMANCE OF NANOCOMPOSITE MATERIALS
Klaus Friedrich, University of Kaiserslautern, Germany
- R-IV.2** 17:00 INVESTIGATION OF MECHANICAL PROPERTIES OF HYBRID POLYMER MATERIALS ON MESO, MICRO AND NANO-LEVEL
A. Sarkissov(a), H. Fischer(b), H.E.H. Meijer(a), (a)Materials Technology (MaTe), Eindhoven University of Technology, 5600 MB Eindhoven, The Netherlands, (b)TNO Institute of Applied Physics, 5600 AN Eindhoven, The Netherlands
- R-IV.3** 17:20 THERMALLY INDUCED RELAXATION PROCESSES IN SUPER-HARD NANOCOMPOSITES STUDIED BY MEANS OF INTERNAL FRICTION MEASUREMENTS
S.Z. Li(a), Q.F. Fang(b), Z.S. Li(b), J. Gao(c), P. Nesladek(d), J. Prochazka(d) and S. Veprek(d), (a)Qingdao University of Science and Technology, Qingdao 266042, P.R. China, (b)Key Laboratory of Internal Friction and Defects in Solids, Institute of Solid State Physics, Chinese Academy of Sciences, Hefei 230031, P.R. China; (c)Chengdu Tool Research Institute, Chengdu 610051, P.R.China; (d)Institute for Chemistry of Inorganic Materials, Technical University Munich, 85747 Garching, Germany
- R-IV.4** 17:40 ON MODELS CONSTRUCTING IN MECHANICS OF NANOCOMPOSITES
A.N. Guz, Institute of Mechanics, Dynamics and Stability of Solids, Nesterov Str. 3, 03680 Kiev, Ukraine
- R-IV.5** 18:00 EFFECT OF MOISTURE ON THERMO-MECHANICAL PROPERTIES OF POLYMER-CLAY NANOCOMPOSITES
Chugang Hu and Jang-Kyo Kim, Department of Mechanical Engineering, Hong Kong University of Science & Technology, Clear Water Bay, Kowloon, Hong Kong
- R-IV.6** 18:20 DESIGN OF A NEW THICK FILM CAPACITIVE PRESSURE AND CIRCUITRY INTERFACE
K. Arshak, E. Jafer, Electronic & Computer Engineering Departement, University of Limerick, Plassey Technological Park, Limerick, Ireland

Thursday, May 27, 2004

Morning

11:00 – 12:45

POSTER SESSION

- R/P.01** AQUEOUS SYNTHESIS OF YTTRIA STABILISED ZIRCONIA-ALUMINA NANOCOMPOSITES
E. Geuzens(a), S. Mullens(b), M.K. Van Bael(a), H. Van den Rul(a), J. Mullens(a), L.C. Van Poucke(a), (a)Laboratory of Inorganic and Physical Chemistry, IMO, Limburgs Universitair Centrum, Building D, 3590 Diepenbeek, Belgium, (b)Vito, Flemish Institute for Technological Research, Materials Technology, Boeretang 200, 2400 Mol, Belgium
- R/P.02** CHARACTERIZATION OF NANOCOMPOSITE CeO₂-Al₂O₃ COATINGS ELECTRODEPOSITED ON STAINLESS STEEL
I. Avramova(a), P. Stefanov(a), D. Nicolova(b), D. Stoychev(b) and Ts. Marinova(a), (a)Institute of General and Inorganic Chemistry and (b)Institute of Physical Chemistry, Bulgarian Academy of Sciences, Sofia 1113, Bulgaria
- R/P.03** SYNTHESIS OF CuInS₂ NANOWIRES AND THEIR CHARACTERIZATION
Kazuki Wakita, Masaya Iwai, Yoshihiro Miyoshi, Hideto Fujibuchi and Atsushi Ashida, Department of Physics and Electronics, Graduate School of Engineering, Osaka Prefecture University, Japan
- R/P.04** INORGANIC COPOLYMERS BASED ON SYLANES AND FERROCENE MONOMERS, PRECURSORS FOR ADVANCED NANOSTRUCTURED CERAMICS
Anca Dumitru(a), I. Stamatina(a), Adina Moroza(a), V. Ciupina(b), Dan Mihaiescu(a), and G.Prodan(b), (a)University of Bucharest, Faculty of Physics, 3Nano-SAE Research Centre, Bucharest –Magurele , MG-11, Romania, (b)“Ovidius” University of Constanta, Bd. Mamaia 124, Constanta, Romania
- R/P.05** THERMAL STABILITY OF TI-SI-N NANOCOMPOSITE THIN FILMS
S. Carvalho, F. Vaz, L. Rebouta, Dept. Física, Universidade do Minho, Campus de Azurém, 4800-058 Guimarães, Portugal, Ph. Goudeau, J.P. Rivière, Laboratoire de Métallurgie Physique, Université de Poitiers, 86960 Futuroscope, France, E. Alves, ITN, Dept. de Física, E.N.10, 2686-953 Sacavém, Portugal
- R/P.06** EFFECTS OF IRON ADDITION ON THE STRUCTURE AND MECHANICAL PROPERTIES OF TITANIUM NITRIDE FILMS
S. Zerkout(a), S. Achour(b), O. Bourbia(b), (a)Electronic Laboratory, University of Skikda, Algeria, (b)Ceramics Laboratory, University of Mentouri, Constantine, Algeria
- R/P.07** STRUCTURE AND TRIBOLOGICAL BEHAVIOUR OF REACTIVELY SPUTTERED Zr-Si-N NANOCOMPOSITE COATINGS
D. Pilloud and J.F. Pierson, Institut FEMTO (UMR CNRS 6174), Département CREST, Université de Franche-Comté Pôle Universitaire, BP 71427, 25211 Montbéliard cedex, France, J. Takadoum, Laboratoire de Microanalyse des Surfaces, ENSMM, 26 chemin de l'Épitaphe, 25030 Besançon cedex, France
- R/P.08** THE SYNTHESIS AND CHARACTERIZATION OF HYDROXYAPATITE/ULTRAFINE DIAMOND COMPOSITE
H.L. Li, Y. Huang, S.T. Chen and Z. Yang, Department of Chemistry, Lanzhou University, Lanzhou 730000, China
- R/P.09** THERMAL EXPANSION OF SINGLE-WALLED CARBON NANOTUBE REINFORCED NANO-AI COMPOSITE
Yongbing Tang, Hongtao Cong, Rong Zhong, Huiming Cheng, Shenyang National Laboratory for Materials Science, Institute of Metal Research, Chinese Academy of Sciences, 72 Wenhua Road, Shenyang 110016, PR China
- R/P.10** SUBSTRATE BIAS VOLTAGE EFFECT ON THE PROPERTIES OF COPPER/CARBON NANOCOMPOSITE FILMS PREPARED BY MICROWAVE PLASMA-ASSISTED DEPOSITION TECHNIQUES
V.V. Ugllov, V.M. Anishchik, A.K. Kuleshov, M.V. Novitskaya, Belarussian State University, Pr. F. Scoriny 4, 220080 Minsk, Belarus, S.N. Dub, Institute for Superhard Materials, Avtozavodskaya Str. 2, 07074 Kiev, Ukraine, F. Thiéry, Y. Pauleau, National Polytechnic Institute of Grenoble, CNRS-LEMD, B.P. 166, 25 Rue des Martyrs, 38042 Grenoble cedex 9, France
- R/P.11** STUDY ON THE PREPARATION AND CHARACTERIZATION OF ULTRA-HIGH MOLECULAR WEIGHT POLYETHYLENE/CARBON NANOTUBES COMPOSITE FIBER
Ruiling Cheng, Linli Liang, Yanping Wang, College of Material Science and Engineering, Donghua University, Shanghai 200051, P.R. China, Yimin Wang, State Key Laboratory for Chemical Fiber and Polymer Materials, Donghua University, Shanghai 200051, P.R. China
- R/P.12** TITANIUM DIOXIDE DOPED POLYANILINE - CHARACTERIZATION OF Ni/P AUTOCATALYTIC DEPOSITS CONTAINING ULTRAFINE DIAMOND
Hu-Lin Li, Ji-Chuan Xu, Hui Xu, Zhi Yang and Yan-Li Shi, Department of Chemistry, Lanzhou University, Lanzhou 730000, People's Republic of China
- R/P.13** NANOSTRUCTURAL EVOLUTION AND SPECTRAL IMAGING OF Cu-Al₂O₃ NANOCOMPOSITES PREPARED BY IN-SITU REDUCTION AND THERMO-MECHANICAL PROCESSED
M. Motta, I.G. Solórzano, E.A. Brocchi and P.K. Jena, Department of Materials Science and Metallurgy, Catholic University of Rio de Janeiro (PUC-Rio), Brazil
- R/P.14** POSSIBILITY OF FABRICATING CARBON NANO-SIZED FIBER REINFORCED COPPER COMPOSITE USING LIQUID INFILTRATION PROCESS
Sangkwon Lee, Doohyun Kim, Moonkwang Um, Materials Engineering Department, Korea Institute of Machinery and Materials, Changwon 641-010, Korea, Younghwan Jang, Sangshik Kim, Division of Materials Science and Engineering, Gyeongsang National University Chinju 660-701, Korea