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Welcome

Encouraged by the success of the 1st and 2nd IEEE International NanoElectronics Conference (INEC) held in Singapore in 2006 and Shanghai in 2008, the 3rd INEC is held in City University of Hong Kong from January 3 to 8, 2010. Extensive research on nanomaterials has unveiled many interesting and promising materials properties for novel applications in electronics, photonics, and biology. In order to benefit mankind for such discoveries, it is necessary to cross the chasm between nanomaterials and nanodevices and their applications. This effort requires a multi-disciplinary approach combining research in materials design, processing, modeling, characterization, and metrology. Commercialization of nanotechnology is also important to fuel future research. The aim of this conference is to identify the paths between fundamental research and potential electronic, photonic, and biological applications. INEC2010 provides a forum for international academics, researchers, practitioners, and students working in the areas of nanofabrication, nanoelectronics, nanophotonics, and nanobiology to discuss new developments, concepts, and practices, and to identify future research needs so that nano-research can be brought closer to its immense potential.

INEC2010 features 4 plenary and 22 invited talks by international scientists in nanofabrication, nanoelectronics, nanophotonics, and nanobiology. A special symposium on nanoscience and nanotechnology in China is held during the conference to foster further scientific exchange between scientists from Greater China and other parts of world. We are very fortunate to have 16 academicians of the Chinese Academy of Sciences, Chinese Academy of Engineering, and Academia Sinica to give presentations in this special symposium.

INEC2010 is the largest one of this growing event. We are very pleased to have received 911 contributed abstracts including 503 oral and 408 poster presentations from 35 countries and special administrative regions.

Hong Kong being a vibrant and modern city where east and west meet is very exciting. The city offers superb dining and attractions and boasts one of the most impressive skylines in the world. In addition to the technical events, I urge you to experience and enjoy our unique city.

Paul K Chu
General Chair
Key Laboratory of Inorganic coating materials, Shanghai Institute of Ceramics, Chinese Academy of Sciences, Shanghai 200050, China. *Contacting Author: Xuanyong Liu is with Shanghai Institute of Ceramics, Chinese Academy of Science, China. (Phone: +86-21 52412409; fax: +86-21 52412409; email: xyliu@mail.sic.ac.cn).

10:30 The Antibacterial Activities of Nano-Ag Synthesized by PAMAM on PET Film Surfaces After DBD Plasma Treatment
Juan Li, Qiang Chen *, and Lizhen Yang Laboratory of Plasma Physics and Materials, Beijing Institute of Graphic Communication, 102600, Beijing, China. *corresponding author: Qiang Chen (Email: lppmchenqiang@hotmail.com Tel: +0086-10-6026-1099)

10:45 Bio-inspired Energy Conversion Systems Based on Ion Channel
Lei Jiang Center of Molecular Sciences, Institute of Chemistry, Chinese Academy of Sciences, Beijing 100190, P. R. China E-mail: jianglei@iccas.ac.cn

11:00 Learning from Nature about Principles of Hierarchical Materials
Huajian Gao *
Division of Engineering, Brown University, Providence, RI 02912, USA. Email: huajian_gao@brown.edu

11:30 Nickel ion level in scoliotic patients implanted with nitrogen plasma surface modified nickel-titanium superelastic spinal implant
KWK Yeung1, WN Lam1, D Natarajan1, SL Wu2, T Hu2, PK Chu2, CY Chung2, WW Lu1, KDK Luk1, KMC Cheung1*
1Department of Spine Surgery, Department of Orthopaedics and Traumatology, The University of Hong Kong, Pokfulam, Hong Kong, China 2Department of Physics and Materials Science, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong, China e-mail: wkkyeung@hku.hk

11:45 The effect of Ethylene Vinyl Acetate and Poly(methyl methacrylate) substrates that contain organo clay and adsorbed Fe2O3 nanoparticles on cell growth and proliferation
Hilana M. Lewkowitz-Shpuntoff a,* , Mary C. Wenb, Avtar Singhc, Nicole Brennerd, Richard Gambino d, Nadine Pernodetd, Rebecca Isseroffa, Miriam Rafailovichd,*, Jon Sokolovd
a Department of Chemistry, Princeton University, Princeton, NJ 08544, USA b Department of Electrical Engineering, Princeton University, Princeton, NJ 08544, USA c Department of Physics, Cornell University, Ithaca, NY14850, USA d Department of Material Science and Engineering, SUNY at Stony Brook, Stony Brook, NY11794, USA e Lawrence High School, Cedarhurst, NY11516, USA hlewkowi@princeton.edu

12:30 Lunch

14:00 Poster Session

16:00 Break

Chair: Yingchun ZHU, Shanghai Institute of Ceramics, CAS
Hairong LIU, Hunan University

16:15 Chitosan-PEI graft copolymers for pDNA delivery: Fabrication and in vitro properties
Wing-Fu Lai and Marie C. M. Lin
Department of Chemistry, University of Hong Kong, Hong Kong Special Administrative Region, China. * Correspondence: W. F. Lai (e-mail: rori0610@graduate.hku.hk) and M. C. M. Lin (phone:...
Nickel ion level in scoliotic patients implanted with nitrogen plasma surface modified nickel-titanium superelastic spinal implant

KWK Yeung, WN Lam, D Natarajan, SL Wu, H Tu, PK Chu, CY Chung, WW Lu, KDK Luk, KMC Cheung

1Division of Spine Surgery, Department of Orthopaedics and Traumatology, The University of Hong Kong, Pokfulam, Hong Kong, China
2Department of Physics and Materials Science, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong, China

e-mail: wkkyeung@hku.hk

Introduction: Nickel-titanium (NiTi) shape memory alloys have been used as surgical implants in orthopaedic procedures. These materials have two distinctive properties, superelasticity and shape memory, that most other current medical metallic materials do not possess. Toxic nickel particulate debris released from these materials, however, remains a major concern particularly pertaining to orthopaedic implants for which fretting is always expected at the implant junction. Metalic debris is suspected to be associated with post-operation complications such as implanted-induced osteolysis, pseudoarthrosis, subacute low-grade implant infection, late operative site pain and abnormal metal concentration in serum. Therefore, an advanced surface technology using plasma immersion ion implantation (PIII) has been developed to address this issue. This paper describes serum nickel ion level monitoring of patients with scoliosis operated upon using nitrogen plasma implanted NiTi spinal rods compared with standard titanium alloy rods in a randomized human clinical trial.

Methods: NiTi spinal rods with 50.8% Ni were treated by nitrogen PIII at 40kV with 100Hz. Seventeen patients with spinal scoliosis were surgically treated by either Ti alloy rods or nitrogen plasma implanted NiTi rods. The mean age at operation was 16.6 years. The mean number of treated spinal segments was 9. Blood samples were collected as baseline before surgery and up to 1 year post-surgery. Nickel levels were assayed by inductively coupled plasma mass spectrometry. Twelve patients (7M and 5F, 6=NiTi and 6=Ti) were followed up for 6 months, and five patients (2M and 3F, 2=NiTi and 3=Ti) had completed 1-year follow-up.

Results: From Figures 1 and 2, in all cases, patients who had NiTi rods implanted had a 2.5 times increase in the Ni level at Day 1 after surgery as compared with before surgery. However, all were within recommended safe limits. The Ni levels returned to baseline in all subjects between 7 days to 1 month post-surgery. No clinical signs and symptoms of Ni allergy or toxicity was observed. The patients who had Ti alloy rods implanted remained no change.

Discussion: This study has successfully demonstrated that the nitrogen plasma treated nickel titanium spinal rods are safe to the patients while undergoing scoliosis correction surgery. The increased nickel level in the patients with NiTi rods may attribute to the unprotected ends. Due to the surgical maneuver, the two ends of the rods were cut to fit the operated length of patients. Therefore, the untreated ends were exposed and contacted with the surrounding human tissues and bloods. However, the nickel levels gradually returned to the baseline. We believe that the unprotected ends had been protected by the newly formed oxide layer after a period of operation.

Figure 1 Serum nickel level from pre-op Day 1 to post-op 24 weeks of the patients using SMA and USS rod.

Figure 2 Serum nickel level from pre-op Day 1 to post-op 1 year of the patients using SMA and USS rod.