# MEETING AT-A-GLANCE

**Wednesday, January 12, 2011**

**Ballroom A**
- **9:30 AM - 10:00 AM**
  - **Symposium Session**
  - **Session Chair:**
  - **Panelists:**

**Ballroom B**
- **9:30 AM - 10:00 AM**
  - **Symposium Session**
  - **Session Chair:**
  - **Panelists:**

**Room 100**
- **9:30 AM - 10:00 AM**
  - **Symposium Session**
  - **Session Chair:**
  - **Panelists:**

**Room 102**
- **9:30 AM - 10:00 AM**
  - **Symposium Session**
  - **Session Chair:**
  - **Panelists:**

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**Saturday, January 15, 2011**

**Ballroom A**
- **9:30 AM - 10:00 AM**
  - **Symposium Session**
  - **Session Chair:**
  - **Panelists:**

**Ballroom B**
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**Sunday, January 16, 2011**

**Ballroom A**
- **9:30 AM - 10:00 AM**
  - **Symposium Session**
  - **Session Chair:**
  - **Panelists:**

**Ballroom B**
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**Program Book**

2011 Annual Meeting of the Orthopaedic Research Society

January 13-16, 2011

Long Beach Convention Center · Long Beach, California
### MEETING AT-A-GLANCE

#### Wednesday, January 12, 2011

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Introduction: Ti-6Al-4V is widely used in present orthopedic applications, owing to a combination of good mechanical properties and excellent corrosion resistance. However, long-term success of Ti-6Al-4V implants and the completeness of their osteointegration still need to be addressed [1]. Since the biofunctionality of the implant is strongly affected by its surface characteristics, to promote osteointegration, considerable efforts have focused on modifying the surface of the implant. Alternatively, surface modification using plasma immersion ion implantation (PIII) has been developed in order to incorporate new biofunctional groups onto titanium alloys surface [2]. The present study aims at investigating the impact of carbon-oxygen (Car-Oxy) dual plasma surface treatment on bioactivity of Ti-6Al-4V alloy surfaces.

Methods: Ti-6Al-4V discs measuring 5 mm in diameter and 1.5 mm in thickness were prepared and polished to mirror finish. Carbon, oxygen and carbon-oxygen dual PIII treatments were applied at an implantation energy of 47 kV, 40 kV and 40 kV, with a radio frequency at 10Hz, 200 Hz and 200 Hz, and pulse width at 500 µs for 2 hours, 30µs for 2 hours and 30µs for 2 hours, respectively. Assessments of surface bioactivity using MC3T3-E1 osteoblasts were conducted. In the cell adhesion assay, 10000 cells were cultured on various sample surfaces for 4 hours. The seeded samples were stained with the aid of LIVE/DEAD Staining Kit and observed by fluorescence microscopy. The total number of adhered cells was estimated according to the image-sample surface area ratio. Cell proliferation was measured by MTT assay on days 2, 4 and 7 of cell culturing. Quantification of cell number was conducted by measuring the absorbance value of MTT solution at wavelength 570nm using a spectrophotometer.

Results: The samples with dual PIII treatment have rougher surfaces and more cell attachment as compared to their corresponding single PIII treated samples and untreated sample (p<0.05) (Fig. 1-2). The cell viability assay indicates that dual PIII treatment evidently improves osteoblast proliferation (Fig. 3).

Discussion and Conclusion: Based on the results of cell adhesion and proliferation, carbon-oxygen dual plasma surface treatment can stimulate osteoblast activity at the early stage of cell-material interaction and show better bioactivity as compared to single PIII treated and untreated samples. The bioactivity enhancements may be attributed to the enhancement of surface roughness and the coexistence of carbon and oxygen functional groups formed at high implantation energy.

In conclusion, carbon-oxygen dual plasma immersion ion implantation treatments enhance surface roughness and promote osteoblast adhesion and proliferation on Ti-6Al-4V alloy surface. The dual PIII technique may be a simple and effective method for the improvement of surface bioactivity of biomedical implants.

References:

Acknowledgement: This study was financially supported by HKU Seed Funding for Basic Research and RGC GRF #123708.