Maxillofacial Reconstruction and Function

Metallic Biomaterials (Metals)

1. Staffs and Students (April, 2009)
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2. Purpose of Education
Metallic biomaterials play an important roll as medical devices. Our laboratory mainly deals with effects of crystal
structure, process, and thermal treatment on mechanical properties (e.g. strength or toughness). We also focus on
structure and property of nanometer-scaled surface phenomena: Formation of living tissue on metals, especially, reactions
between biomolecules or cells and metals, changes in surface oxide layers in living tissues, and electrochemical property
of metallic biomaterials. The aim of the education is perfect understanding of metallic biomaterials, enabling students to
select a proper material for medical treatments or researches.

3. Research Subjects
A) Bio-functionalization of metals with surface modification
Bio-functionalization on metals is investigated with surface treatment techniques, such as bio-functional molecule
immobilization and electrochemical treatments.
B) Development of novel alloys for biomedical applications
Novel alloy systems for biomedical applications are explored from the viewpoint of mechanical properties and
biocompatibility.
C) Development of porous metals composites with mechanical compatibility
Porous metal based composites having low Young’s modulus with sustained release of inorganic ion are fabricated.
D) Development of Zr-based alloys for minimizing MRI artifacts
Zr-based alloys with high strength are investigated for the suppression of MRI artifact.

4. Publications
Original Articles
Calcification by MC3T3-E1 cells on RGD peptide immobilized on titanium through electrodeposited PEG.
3. Tsutsumi Y, Nishimura D, Doi H, Nomura N, Hanawa T. Difference in surface reactions between titanium and
zirconium in Hanks’ solution to elucidate mechanism of calcium phosphate formation on titanium using XPS and
5. Eliaz N, Kopelovitch W, Burstlein L, Kobayashi E, Hanawa T. Electrochemical processes of nucleation and growth of
calcium phosphate on titanium supported by real-time quartz crystal microbalance measurements and X-ray
6. Park JW, Jang JH, Lee CS, Hanawa T. Osteoconductivity of hydrophilic microstructured titanium implants with
(XIVE S CELLplus™) by addition of surface calcium chemistry: a histomorphometric study in the rabbit femur. Clin

Review Articles

Book