NUS Nanoscience & Nanotechnology Initiative (NUSNNI)

Distribution and Chemical State Analysis of Rarely Contained Metallic Elements in Biological Tissues

Speaker: Associate Professor Motohiro Uo, Department of Biomedical Materials & Engineering, Graduate School of Dental Medicine, Hokkaido University, Japan
Venue: Blk EA, #06-04 (Seminar Room), Faculty of Engineering
Date: 10th November 2006 (Friday)
Time: 3.00pm – 4.00pm

Abstract:

We have studied the tissue reaction and biocompatibility for various metals using an X-ray scanning analytical microscope (XSAM). However, the chemical states of eroded metallic elements in the human body have not been reported because of their quite low concentrations. In this study, fluorescence X-ray absorption fine structure (XAFS) was applied for the analysis of human soft tissue in contact with titanium dental implants to reveal the chemical state of titanium transferred from the placed implant into the surrounding tissue. In the presentation, other application of XSAM and XAFS for the rarely contained elements or foreign bodies in biological tissues would also be presented.

Biography:

Education:
1982-1987 Department of Metallurgy, Faculty of Engineering, University of Tokyo
Awarded the degree of BEng in metallurgy
1987-1989 Department of Metallurgy, Faculty of Engineering, University of Tokyo
Awarded the degree of MEng in metallurgy for a thesis entitled "A study for the behavior of sulfer in slags".
1989-1992 Department of Metallurgy, Faculty of Engineering, University of Tokyo
Awarded the degree of DEng in metallurgy for a thesis entitled "Preparation of porous glass and immobilization of biological catalyst".

Research and professional experience:
1992-1994 Research Associate at the Department of Metallurgy, Faculty of Engineering, University of Tokyo
1994-2001 Research Associate at the Department of Dental Materials and Engineering, School of Dentistry, Hokkaido University
2001-present Associate Professor at the Department of Biomedical Materials and Engineering, Graduate School of Dental Medicine, Hokkaido University

Recent Publications;

1)Uo M., Watari F., Yokoyama A., Matsuno H., Kawasaki T. : Tissue reaction around metal implants observed by X-ray scanning analytical microscopy, Biomaterials, 22, 677-685, 2001
2)Uo M., Watari F., Yokoyama A., Matsuno H., Kawasaki T. : Visualization and detectability of elements rarely contained in soft tissue by X-ray scanning analytical microscopy and electron probe micro analysis, Biomaterials, 22, 1787-1794, 2001
3)Uo M.,Sjoegren G., Sundh A., Watari F., Bergman M., Lerner U. : Cytotoxicity and bonding properties of dental ceramics, Dental Materials, 19, 487-492, 2003
4)Uo M., Berglund A., Cardenas J., Pohl L., Watari F., Bergman M., Sjoeberg S. : Surface analysis of dental amalgams by x-ray photoelectron spectrometry and x-ray diffraction spectrometry, Dental Materials, 19, 639-644, 2003
5)Uo M., Watari F.: Rapid analysis of dental metallic restoratives using X-ray Scanning Analytical Microscope, Dental Materials 20, 611-615, 2004
6)Uo M., Tanaka M., Watari F.: Quantitative analysis of biological specimens by X-ray scanning analytical microscope, Journal of Biomedical Materials Research, PartB Applied Biomaterials 70B, p.146-151, 2004
7)Uo M., Okamoto M., Watari F., Tani K., Morita M., Shintani A.: Rare earth oxide containing fluorescent glass filler for composite resin, Dental Materials Journal, 24, 49-52, 2005
8)Uo M., Asakura K., Yokoyama A., Tamura K., Totsuka Y., Akasaka T., Watari F.: Analysis of Titanium Dental Implants Surrounding Soft Tissue using X-ray Absorption Fine Structure (XAFS), Chemistry Letters, 34, 776-777, 2005
9)Uo M., Tamura K, Sato Y., Yokoyama A., Watari F., Totsuka Y., Tohji K.: The cytotoxicity of metal encapsulating carbon nanocapsules, Small, 1, 816-819, 2005
10)Uo M., Asakura K., Kohgo T., Watari F.: Selenium distribution in human soft tissue determined by using X-ray scanning analytical microscope and X-ray absorption fine structure analysis, Chemistry Letters, 35, 66-67, 2006
11)Uo M., Sjoegren G., Sundh A., Goto M., Watari F., Bergman M.: Effect of surface condition of dental zirconia ceramic (Denzir) on bonding, Dental Materials Journal, 25, 626-631, 2006

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