MM 44: Bioinspired Materials

Time: Thursday 14:00–14:30 Location: H 0111

MM 44.1 Thu 14:00 H 0111

AFM-investigation of differently treated Ti-surfaces with respect to their usability for dental implants — •Sebastian Wille[1], Bin Yang[2], Rainer Adelung[1], and Birte Grössner-Schreiber[3] — [1]Funktionale Nanomaterialien, Institut für Materialwissenschaft, CAU Kiel Kaiserstr. 2 24143 Kiel — [2]Klinik für Zahnärztliche Prothetik, Propädeutik und Werkstoffkunde, Arnold-Heller-Strasse 16, 24105 Kiel — [3]Klinik für Zahnerhaltungskunde und Parodontologie, Arnold-Heller-Str. 16, 24105 Kiel

Microbial adherence to dental implant surfaces is one initiating step in the formation of plaque and is considered to be an important event in the pathogenesis of peri-implant disease [1]. Besides good connective tissue adhesion in the transmucosal part of an implant, titanium implants exposed to the oral cavity require surface modification to inhibit the adherence of oral bacteria. Surface roughness and chemical composition of the implant surface were found to have a significant impact on plaque formation. The aim of the present study was to examine bacterial adherence of differently modified potential implant surfaces. Therefore the surface roughness was decreased and for example a thin ceramic or composite layer of antibacterial material was deposited on abutment surface by sputtering. We analyze the new surface with AFM to control the roughness. For further characterization contact angle measurements were carried out. Biocompatibility and antibacterial effects will be determined in cooperation with the dental clinic at the University Kiel.

[1] B. Größner-Schreiber et al. Clin Oral Impl Res 12, 543-551 (2001)

MM 44.2 Thu 14:15 H 0111

Mechanical implications of the inhomogeneity of bone material — •Carolin Lukas[1,2], Davide Ruffoni[1], Peter Fratzl[1], Paul Roschger[3], Klaus Klaushofer[3], and Richard Weinkamer[1] — [1]Max Planck Institute of Colloids and Interfaces, Department of Biomaterials, Potsdam, Germany — [2]TU Berlin, Germany — [3]Ludwig Boltzmann Institute of Osteology, Vienna, Austria

The mechanical behaviour of bone at the material level is determined by the amount and the distribution of mineral. Bone mineral is heterogeneously distributed because of the continuous remodeling of bone and the consecutive mineralization process. During bone mineralization each newly deposited bone packet increases its stiffness by increasing its mineral content. Differences in mineral content are experimentally accessible and are characterized by a frequency distribution of the mineral content called the bone mineralization density distribution (BMDD). A mathematical framework was developed to predict how different remodeling rates result in different BMDDs. The mechanical implications of such mineralization distributions are here investigated. First, combining measurement of mineral content with micromechanical tests, the BMDD is converted into a distribution of elastic moduli. Secondly, assuming an ideal geometrical arrangement of the bone packets inside the trabeculae the bounds for the elastic properties are established for the different material distributions. Considering then more realistic 3D arrangements of the bone packets, the mechanical implications of the different types of BMDD are computed at the trabecular level.