**Bone remodeling and mineralization investigated by four-dimension micro-computed tomography**

During life time, bone architecture and material are constantly changing due to the processes of bone remodeling and mineralization. Remodeling occurs by removal and deposition of small bone packets from and to the bone surface. The deposited osteoid maturates to bone due to incorporation of mineral into the collagen matrix. These processes allow bone to react to changing mechanical demands and, in case of implant insertion, to maintain the integrity of the bone-implant system. The introduction of in vivo micro-computed tomography (micro-CT) has provided a new option to investigate the dynamical processes of bone remodeling and mineralization in living animals in four-dimension, with the fourth dimension being time. Here, I would like to show some recent applications of in vivo micro-CT to characterize: *i)* the mechanical control of the remodeling process; *ii)* the kinetics of bone mineralization and demineralization; and *iii)* the spatio-temporal changes of bone architecture and remodeling following implantation.

Before concluding the seminar, I would also like to present some ongoing work on additive manufacturing by three-dimensional (3D) inkjet printing. In this technique an acrylic photopolymer is deposited layer-by-layer on a build tray and the photopolymer droplets are immediately cured with ultraviolet light. Recent developments in 3D printing allow the simultaneous depositions of multiple photopolymers with different material properties, ranging from rubber-like to rigid polymers. 3D printing is a powerful and cost effective tool to understand and prototype new material design at the millimeter length scale.