Elemental imaging of trace elements in bone samples

C.Streli, M.Rauwolf, A.Turyanskaya, D.Ingerle, P.Wobrauschek
Atominstitut, TU Wien, Stadionallee 2, 1020 Vienna, Austria streli@ati.ac.at

Micro-XRS is a powerful tool for trace analysis in biological samples. The method was successfully used to measure trace elements in bone tissue samples. Examples from X-ray tube and synchrotron excitation will be presented: The first study investigated the distribution of the elemental constituents of Mg-based implants at various stages of the degradation process in surrounding bone tissue with a focus on magnesium (Mg) and yttrium (Y). The analysis was performed in laboratory of Atominstitut using a special micro-XRF spectrometer for light element detection. The second study is devoted to the spatial distribution of Zn in high-grade sclerosing osteosarcoma mapped by confocal synchrotron radiation induced micro-XRF. Tumour zinc levels were compared with adjacent normal tissue. For discrimination between healthy and diseased bone quantitative backscattered electron imaging was used. The third experiment demonstrates the performance of synchrotron radiation induced nano-XRF with beam size of about 500 nm for bone tissue investigation. Special emphasis is set to advantages of micro- and nano-XRF in bone analysis as well as overcoming possible limitations.