NANOINDENTATION OF BONE TISSUE

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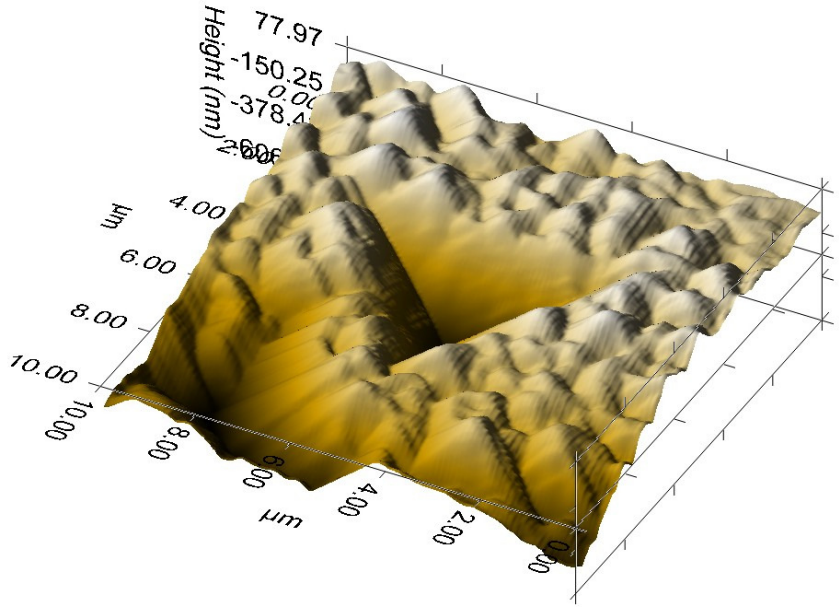
In recent years, osteoporosis research is focusing on bone quality instead of quantity and indentation represents an essential tool in the arsenal of materials science to quantify the mechanical properties of bone tissue. In the first half of the 20th century, the first hardness tests were performed on bone, sample preparation was developed and the leading role of mineralization and collagen organization as major determinants of tissue properties was rapidly identified. In the past ten years, the emergence of depth-sensing instruments allowed to automate and improve the spatial resolution of such measurements down to 100 nm and initiated a new wave of studies devoted to the quantification of bone tissue elastic and micro-hardness properties down to the lamellar level of organization.

First, isotropic and rate-independent contact models were used that provided comparisons of indentation properties between age, gender, disease, anatomical sites, bone structural units and individual lamellae. Despite the significant differences found for many of the above variables, the tissue elastic and hardness properties appear to be independent of age, osteoporosis and reasonably constant (±10%) when compared to bone mass. Currently, new generations of anisotropic, rate-dependent and damage indentation models prepare the grounds for identification of quantitative structure-function relationships of the bone matrix that will hopefully clarify its real contribution to bone fragility.



*Přednáška **v angličtině** se koná ve středu 4.2.2009 od 10 hodin ve velké zasedací síni děkana (místnost B 169) v budově Stavební fakulty ČVUT v Praze, Thákurova 7, Dejvice. **Všichni zájemci jsou srdečně zváni.***

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