



ESRF

**Experiment title:**  
Microdiffraction analysis of bone tissue

**Experiment number:**  
LS352

**Beamline:**  
Bl 1

**Date of experiment:**  
from: to:

**Date of report:**  
30/8 96

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6

**Local contact(s):**  
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## Report:

# Microdiffraction studies of bone tissues using synchrotrons radiation.

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## Summary

A series of studies of the crystallinity of bone tissues have undertaken by means of synchrotrons based micro diffraction. Beside the crystal structure itself also crystallite size distribution and preferential orientation was studied with a spatial resolution comparable with the lamellae thickness (about 7  $\mu\text{m}$ ). The experiments were performed at the micro-focus beam line 1 at ESRF. The samples were longitudinal and transversal cuts from human femoral shafts. The result shows that the bone crystallite have a apatite structure and that they seem to be oriented in two orthogonal directions, one parallel with the haversian system and the other perpendicular following the lamella's curvature. Peak width analysis shows that the crystallite are about 25-40 nm along the c-axis with a width of about 10 nm. The result also shows that the peak width is somewhat larger close to the haversian canal compared to the outer region of the osteon.

A description of the sample material, preparation and experiment will be given together with an overview of previous results from diffraction experiments, X-ray  $\mu$ -beam spectroscopy and micro-radiographic studies. The experimental set-up of the synchrotrons experiments will be described and the general characteristics and capacities for such a set-up will be discussed. The identity of bone mineral as apatite crystals is discussed. The results are described in terms of crystallite orientation and size variation along the osteon radius.

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### Further references of interest:

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