

1.4.24. COMPARISON BETWEEN X-RAY-TUBE BASED AND SYNCHROTRON BASED μ CT

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Nowadays, X-ray tube-based high-resolution CT systems are widely used in scientific research and industrial applications. But the potential, convenience and economy of these lab systems is often underestimated. The present paper shows the comparison of sophisticated conventional μ CT with synchrotron radiation-based μ CT (SR μ CT). The different aspects and characteristics of both approaches like spatial and density resolution, penetration depth, scanning time or sample size is described in detail.

The tube-based μ CT measurements were performed with a granite-based nanotom[®]-CT system (phoenix|x-ray, Wunstorf, Germany) equipped with a 180 kV – 15 W high-power nanofocus tube with tungsten or molybdenum targets. The tube offers a wide range of applications from scanning low absorbing samples in nanofocus mode with voxel sizes below 500 nm and highly absorbing objects in the high power mode with focal spot and voxel sizes of a few microns. The SR μ CT measurements were carried out with the absorption contrast set-up at the beamlines W 2 and BW 2 at HASYLAB / DESY, operated by the GKSS Research Center, Geesthacht, Germany.

The range of samples examined covers materials of very different absorption levels and related photon energies for the CT scans. Both quantitative and qualitative comparisons of CT scans using biomedical specimens with rather low X-ray absorption such as parts of the human spine as well as using composites from the field of materials science are shown.