

Increasing Resolution of X-ray Imaging at High Acceleration Voltages

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Driven by needs from scientific research, healthcare and industrial manufacturing, X-ray microscopy has been successfully transferred from synchrotrons to the laboratory and the spatial resolution has been pushed to sub-micrometer. One way to further improve the resolution is to use an X-ray source with a very small focal spot. At Excillum, based on advanced electron beam and target technologies, a state-of-art nanofocus x-ray tube has been developed which enables an isotropic, resolution of 150 nm line-spacing all the way up to 160 kV of acceleration voltage.

The advanced electron optics of the nanofocus X-ray tube has internal calibration and validation of the electron focus size, translating to the X-ray spot size. This gives the user a confirmation of what the maximum achievable resolution is for each scan, as well as continuous feedback on the performance of the tube.

Until now the NanoTube has been integrated into different Nano-CT systems for applications of materials science [1], biomedical [2] and has recently been integrated in to commercially available NanoCT-systems [3]. This presentation will cover the technology enabling the new tube, as well as a few user examples of how the high resolution, high brightness tube has helped researchers discover previously unseen features in their samples.

References:

[1] C Fella et al., *Microscopy and Microanalysis* **24** (S2) (2018), p. 234.

[2] S Ferstl et al., *IEEE Transactions on Medical Imaging* **1-1** (2019)

[3] CT-ALPHA nanotube, <https://www.procon-x-ray.com/ct-alpha-nanotube/> (February 24, 2022)