

Figure 1: Vertical virtual sections through a standard AAA alkaline battery (a, left) and a nickel-metal hybrid (NiMH) rechargeable battery (a, right). Horizontal section through the NiMH battery (b) and a zoom into the area of the electrical supply (c) and vertical zoom into the same area (d). The three length scale bars in the images correspond to 2.4 mm.

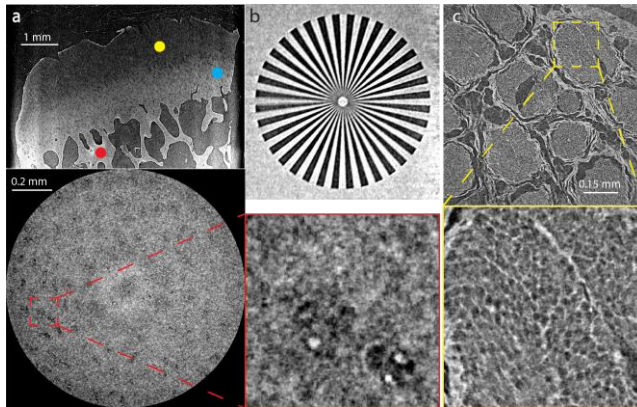


Figure 2: Virtual cuts through a porcine knee cylinder (a) measured with the Polaris system using a pixel length of 2.5  $\mu\text{m}$  (top) and 0.56  $\mu\text{m}$  (bottom). The yellow circle indicates the cartilage, the blue circle the calcified cartilage and the red circle the bone. The zoom-in shows individual chondrocytes in the cartilage. The reconstructed slice through the Siemens star with an outer period of 17.5  $\mu\text{m}$  (b) measured with 0.56  $\mu\text{m}$  pixel size for estimation of the spatial resolution of the system. Virtual cut through a pig nerve measured with a pixel size of 0.56  $\mu\text{m}$  (c).

The Core Facility “MiNa” offers services for X-ray-based, non-destructive three-dimensional imaging for internal and external research groups as well as for users from industry. The analyses can be carried out with isotropic voxel sizes ranging between 50  $\mu\text{m}$  and 100 nm.

MiNa hosts the **nanotom®** and **Skyscan 1275**, two state-of-the-art X-ray microtomography systems for examinations down to the micrometer range. The **xradia 610 Versa** and **Polaris** are two next-generation systems for scans in the sub-micrometer range, which were financed by SNSF R'Equip and installed by the end of 2023.

A wide range of objects can be examined by these systems, such as hard and soft tissue from humans and animals (1) (life sciences), nanoparticles and tablets (pharmaceutical sciences), batteries (energy sector), electronic chips and circuit boards (electronics companies), implants and bone replacement materials (2)(implant companies), or unique objects from museums (3).

Figure 1 shows an industrial example using AAA alkaline and NiMH batteries. The alkaline battery (a, left) has a current collector (bright feature in the centre), within the zinc powder (anode). The manganese oxide cathode is further out, near the outer casing. In the NiMH battery (a, right), the cathode (dark) and anode (light) are rolled into a cylinder with a separator. **X-ray microtomography allows non-destructive faults detection in these batteries.**

Figure 2 shows life sciences examples: A cylinder of porcine cartilage with adherent bone fixed with ethanol was visualised with a resolution down to the chondrocytes (a), pig nerve myelin (bright features) surrounding the axons (c), and the Siemens star (b) used to estimate 1  $\mu\text{m}$  spatial resolution.

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