

Dynamic micro-CT - Pushing the temporal and spatial boundaries for true in situ experimentation

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Abstract

X-ray micro-computed tomography (micro-CT) has opened new avenues of research and understanding. It is now recognized as an essential technique for non-destructive 3D imaging. Extending the technique to the temporal regime, through time-resolved 3D imaging (or 4D imaging), provides a new route to a better and more complete understanding of materials evolution, facilitating in situ investigations ranging from mechanical deformation to fluid flow in porous materials. Imaging of dynamic processes has historically been one of the key applications at synchrotron micro-CT beamlines, extending the limits of temporal resolution further and further. However, access to those facilities is often limited and highly selective.

In lab-based micro-CT, image quality and spatial resolution have been significantly improved over the last two decades, often at the cost of temporal resolution. In addition to sub-micron spatial resolution, TESCAN Dynamic micro-CT solutions make it possible to visualize and inspect multi-dimensional dynamic processes in the laboratory with a temporal resolution below 3 seconds.

In this workshop, we explore the general technique of micro-CT as well as the different aspects and challenges of temporally resolved dynamic X-ray 3D imaging. The use of dynamic CT across the fields of materials science, life science, and geoscience will be highlighted through a number of application examples.