Annual highlights

Danish National Research Foundation (DNRF) Center for Visualizing Catalytic Processes (VISION) aims at tackling one of the most challenging scientific questions in catalysis – namely, how do individual nanoscale particles catalyze chemical reactions? Since the inception in 2020, VISION has worked on developing new highly sensitive research platforms for addressing this question, and the build-up phase culminated the last year by inclusion of a new one-of-a-kind electron microscope, VISION PRIME.

The VISION PRIME was installed in early 2024 by the manufacturer Thermo Fisher Scientific. Subsequently, the center commissioned VISION PRIME by implementing its nanoparticle samples, microfabricated reactors and imaging protocols developed in the preceding period. Specifically, VISION demonstrated a new world-record imaging resolution of ca. 50 pm in the presence of chemical reactive gas environments at mbar-bar pressures. At this level, resolution is limited by the size of the atoms in the specimen rather than the instrument enabling, in turn, visualizations of single atoms and three-dimensional atomic sites in nanoparticles, and hence, the scientific explorations addressing the center's ambitious research goals.

The VISION PRIME was installed in a dedicated laboratory, shielded from acoustic, vibrational and electromagnetic interferences, in the Technical University of Denmark's (DTU's) new Climate Challenge Laboratory (CCL). Upon completion of the CCL in the summer of 2024, the center staff also relocated to gather the center's core research activities in one designated building. With the move of VISION into CCL, our ambition also succeeded in integrating the unique imaging capabilities into a new vibrant, world-leading research environment to create strong interdisciplinary research synergies on addressing key scientific problems related to Power-to-X technologies.

These achievements were celebrated by an inauguration event in October 2024, including introductory speeches by DNRF, DTU and VISION on the scientific ambition, a panel discussion with key stake holders, including Thermos Fisher Scientific, Topsoe A/S, Novonesis A/S, DTU Campus Service and DTU Nanolab, addressing the spirit of collaboration, and finally, a ribbon-cutting inauguration ceremony. The event was attended by 85 collaborators and colleagues from DTU and corporate and academic organizations involved in establishing the VISION PRIME laboratory.