

Annual highlights

In order to address the global climate challenges, it is absolutely central that the production of chemicals, fuels and energy replaces fossil resources with renewable energy and sustainable substances. However, the introduction of new, sustainable processes requires new knowledge about catalysis. Catalysis is the ability to control chemical reaction rates and catalysis can become extremely effective on the surface of nanometer-sized inorganic particles. But it is a huge scientific challenge to understand how their size, shape and structure affect chemical reactions. Although Danish research in catalysis is generally far ahead and enjoys great recognition internationally, the basic scientific question of how individual nanoparticles catalyze chemical reactions at the atomic level is still unanswered. VISION will address this fundamental issue by establishing a radically new scientific paradigm that combines developments in electron microscopy, microfabrication, nanoparticle synthesis and theoretical modeling.

The VISION center opened on 1 March 2020, which also marked center director Stig Helveg's accession to professor at DTU Physics. During the first year, VISION focused on establishing a dynamic research environment. The center is located with offices and laboratory access at DTU Physics and in the pioneering electron microscopy laboratory at Haldor Topsoe A / S.

More than 32 researchers worked in relation to VISION, including close collaborations with the research environments at DTU Physics and Nanolab as well as with external partners. The center also focused on building an efficient organization and establishing its research infrastructure, including the purchase of a single-electron-sensitive camera and a new state-of-the-art electron microscope, as well as the fabrication of microreactors. A virtual communication platform has also been developed to meet the challenges of the COVID-19 related shutdowns and to create transparency around the scientific work. Finally, the center has achieved the first significant scientific results: The center has participated in the development of a new method for three-dimensional imaging of individual nanoparticles with atomic resolution and in the manufacturing of the novel microreactors capable of encapsulating gases and individual nanoparticles. These technological advances are key for reaching the ambition research goals in VISION.

