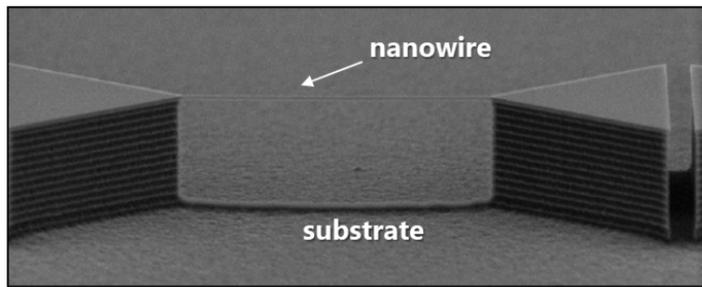


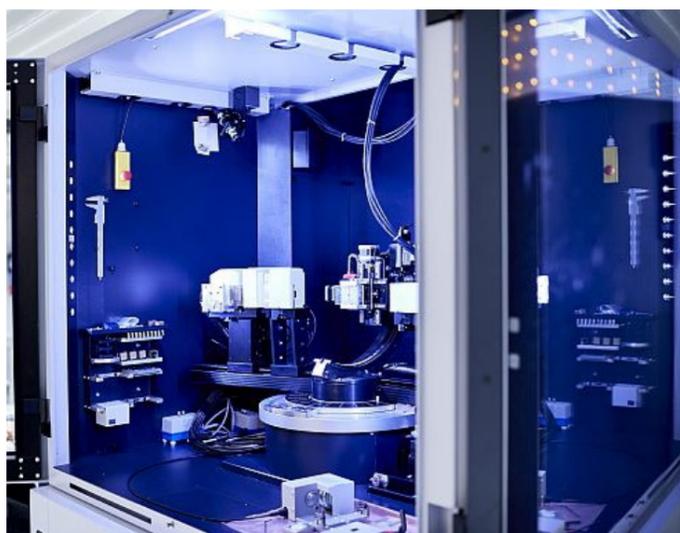
NEMS for sensing application: HR-XRD analysis of free-standing silicon nanowires systems

Motivation and Instrumentation

Silicon nanowire based sensors such as micro and nano electro mechanical systems (MEMS & NEMS) are well known in many fields of application due to their unique physical characteristics. However, their characterization is essential as it also links to their reliability and life time.

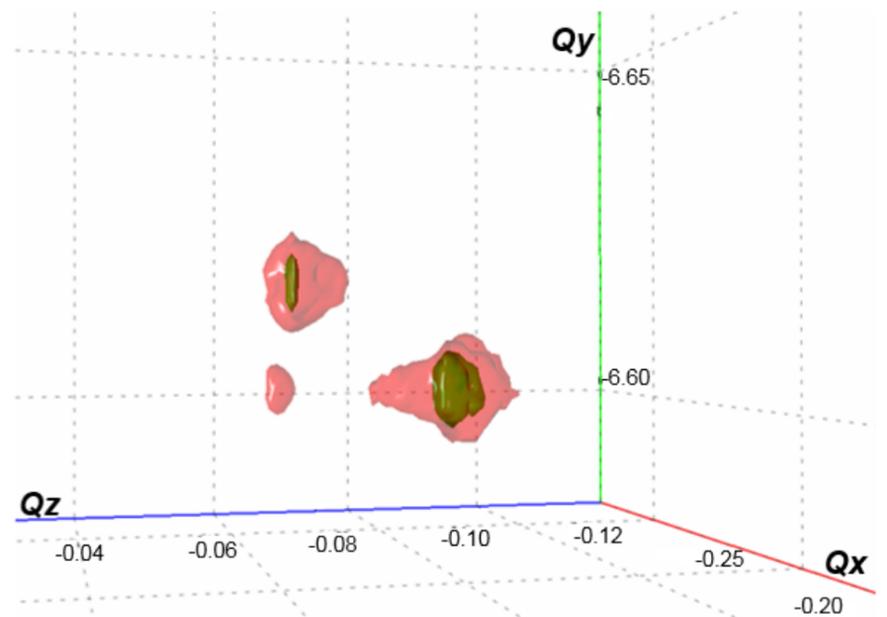


High-resolution X-ray diffraction (HRXRD) analysis results to be one of the best method to assess structural defects and thus to determine their quality. To this end, we use both synchrotron radiation to characterize individual nanowires, and laboratory-based instruments to investigate the entire device.

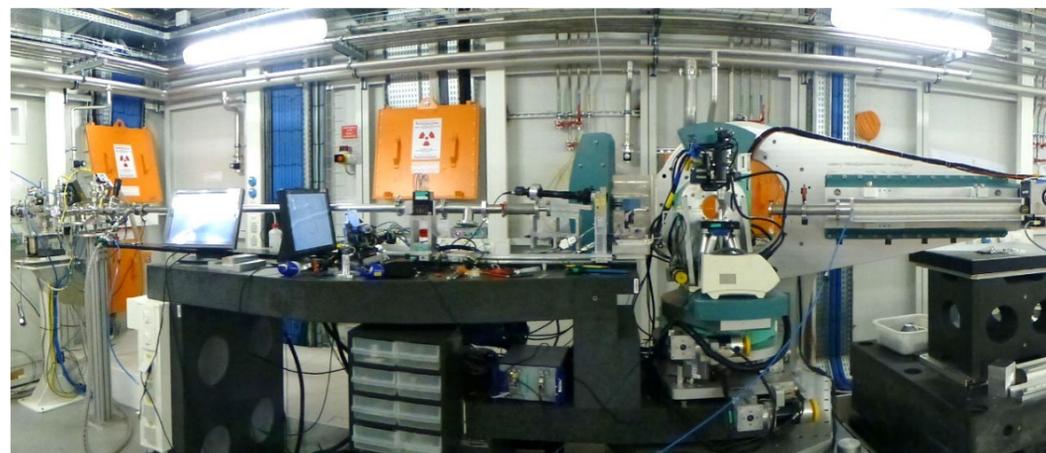


Laboratory Instrument Bruker
Discover D8 Da Vinci

Three-dimensional Reciprocal Space Map (3D-RSM)

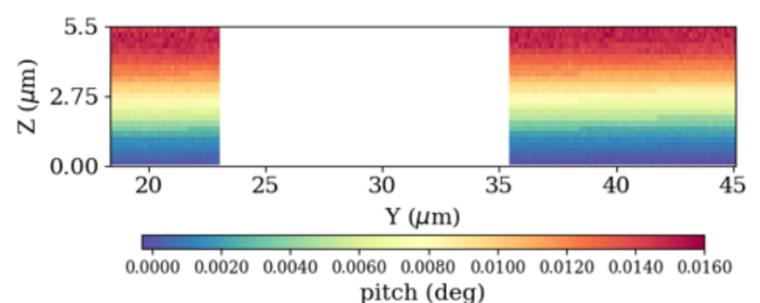
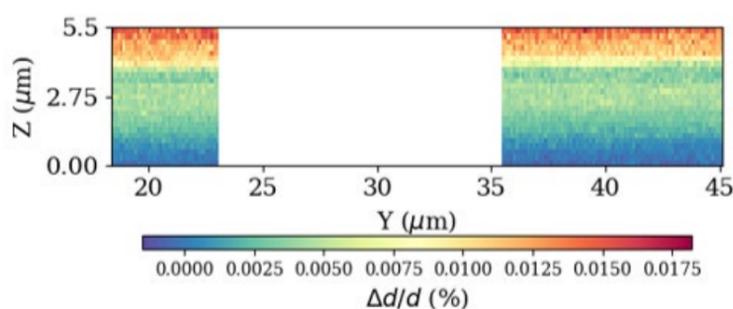


Representation of 3D Bragg peaks within the reciprocal space. Qx, Qy and Qz are the components of the scattering vector \mathbf{Q} . Their evaluation allows to determine structural defects such as strain and tilt.



Beamline ID01, European Synchrotron Radiation
Facility (ESRF), Grenoble, France

Two-dimensional real space maps of lattice strain ($\Delta d/d$) and tilt ($^\circ$) distribution



Reference and collaborations