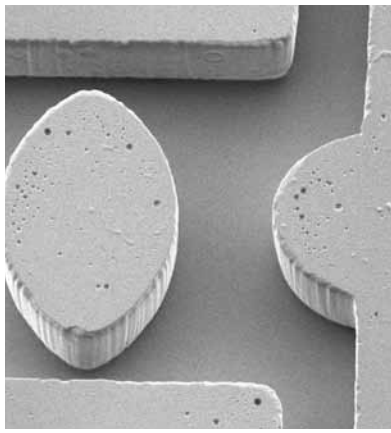
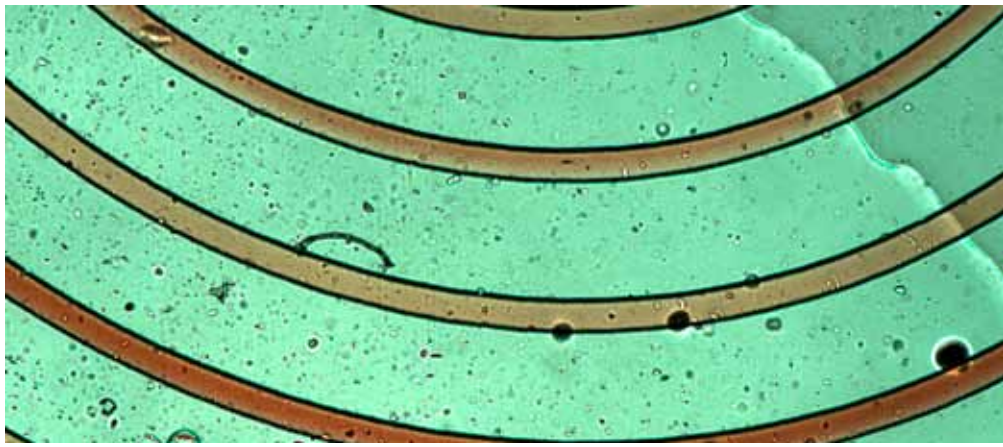




Nanoscience Centre NanoSYD

UNIVERSITY OF SOUTHERN DENMARK

HISTORY AND ORGANISATION

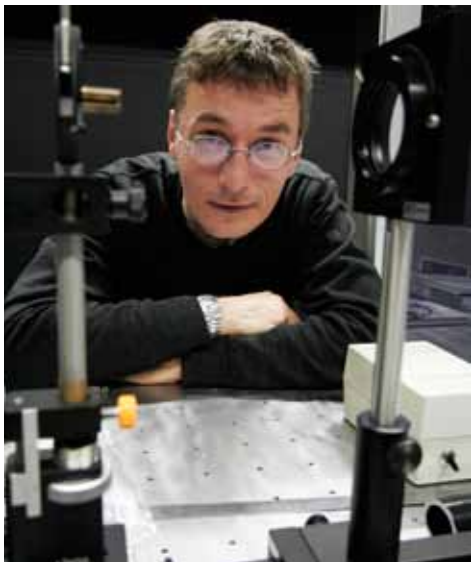
NanoSYD was founded in 2007 as a nanoscience centre at the Mads Clausen Institute at University of Southern Denmark's Faculty of Engineering. The centre is located on Campus Sønderborg, which is part of the science and cultural centre Alsion, close to the Danish-German border.

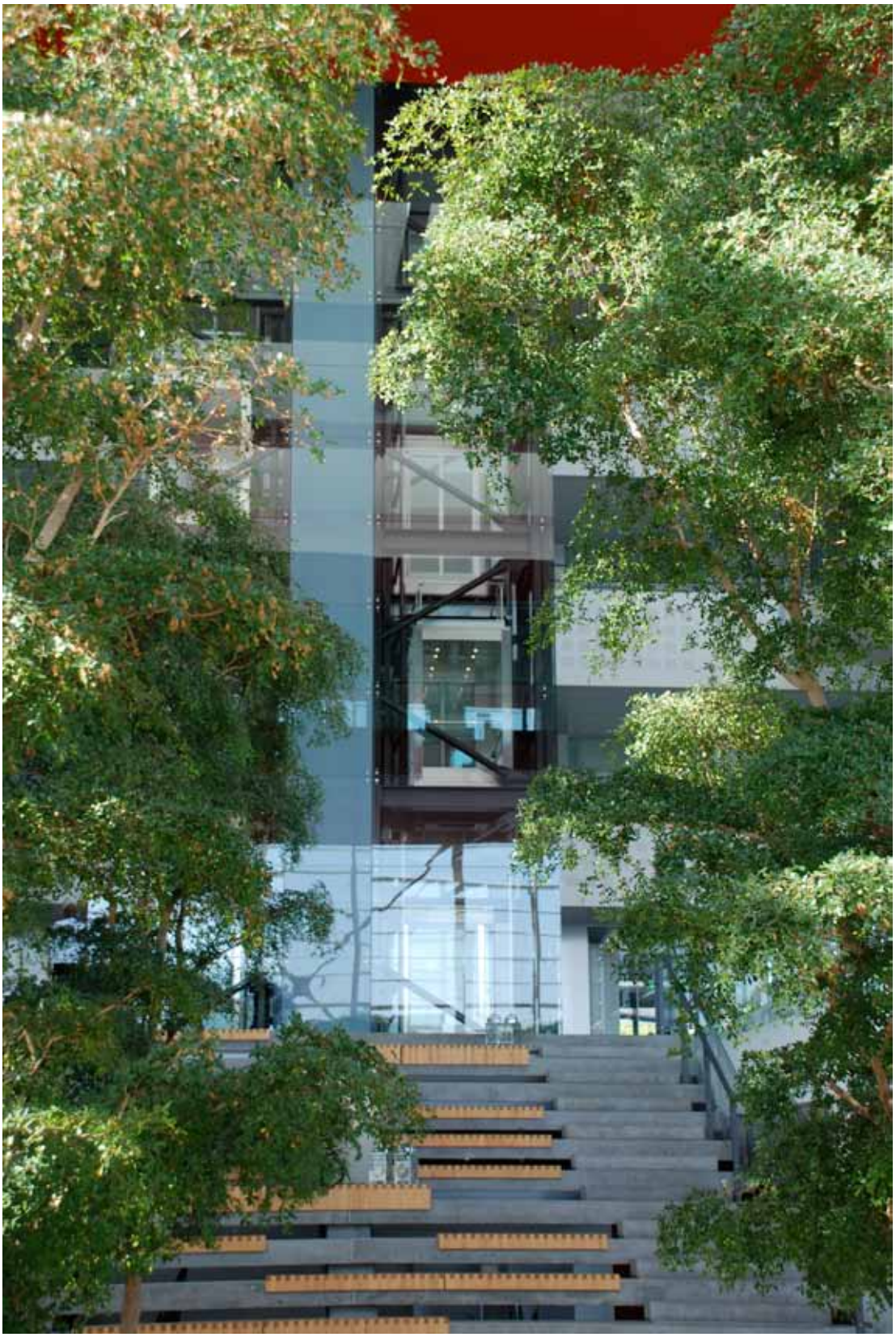
The nanoscience centre hosts the university cleanroom, and optical and surface science laboratories. In 2008 on December 18, the cleanroom was inaugurated. It is prepared for being used by university employees and external users for education, research, and development projects.

The centre is headed by Professor Dr. habil Horst-Günter Rubahn, a physicist educated at University of Göttingen, Stanford University, and University of Kaiserslautern. He worked as visiting professor at University of Toulouse and as research associate at the Max Planck Institute for Fluid Dynamics in Göttingen.

NanoSYD is run by a varying number of associate and assistant professors, technicians, a centre secretary, postdocs, co-operation partners, PhD students, engineering students, and academic guests.

Centre Director Horst-Günter Rubahn



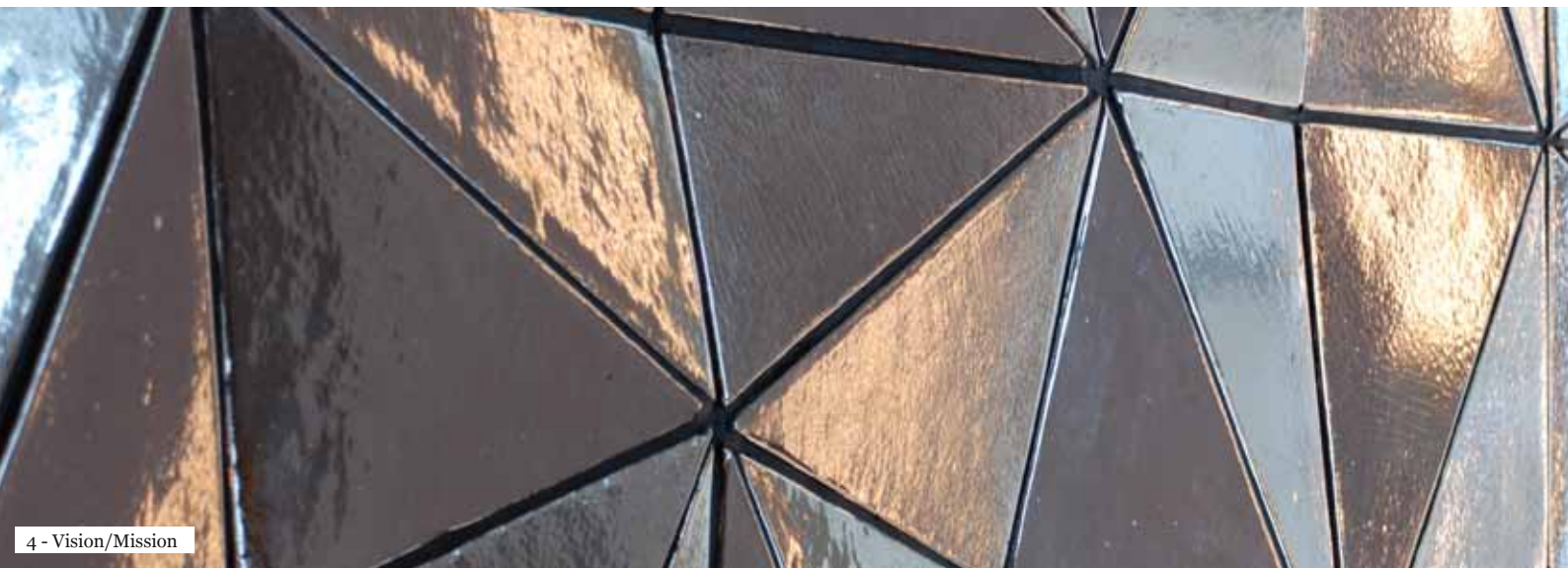


VISION

Bridge education, research, and development in nano- and microtechnologies to promote the development of innovative photonic and electromechanical products.

MISSION

Support the academic and industrial Southern Denmark by giving access to state-of-the-art micro- and nanofabrication facilities, including experimental and theoretical nanoscience and -technology.



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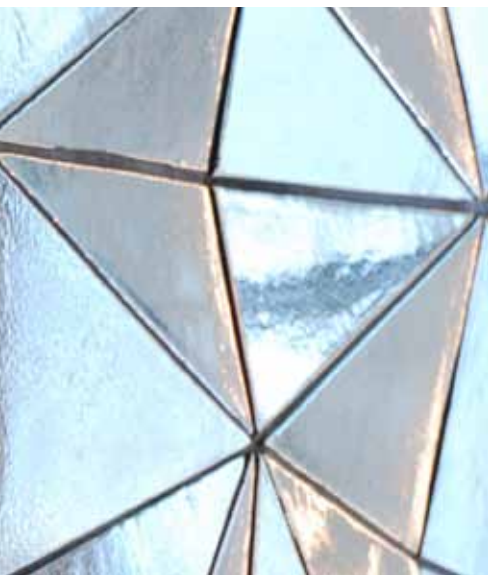

THE CLEANROOM

The cleanroom is a university-owned facility and part of NanoSYD. The centre offers knowledge and competencies to companies and has state-of-the-art equipment within testing and analysis. It also contributes to prototyping and development projects.

Read more about the cleanroom on www.nanosyd.dk and contact us with your specific idea, request, or project proposal.

DEVICE DEVELOPMENT

Devices range from organic LEDs via solar cells and micromechanical systems and sensors to microfluidic platforms, including miniaturised flow cytometers, mixers, etc. Basic fabrication, characterisation, and packaging are performed inside and outside the cleanroom. Rapid prototyping with ultraviolet light is performed via an excimer laser materials treatment station.

MICROSTRUCTURE PROCESSING

NanoSYD hosts a class ISO5 cleanroom equipped for 4” wafer processing. It includes equipment for structure generation on the micro- and nanoscale via photo-, electron beam and nanoimprint lithography, wet and anisotropic dry etching, and thin film deposition of both metals and dielectric materials. Furthermore, NanoSYD has an excimer laser system for materials treatment.

CHARACTERISATION OF SURFACES AND SUBMICRON STRUCTURES

Modern surface characterisation methods, such as electron and atomic force microscopy, are combined with modern optical methods, such as ellipsometry, interference and laser scanning microscopy.

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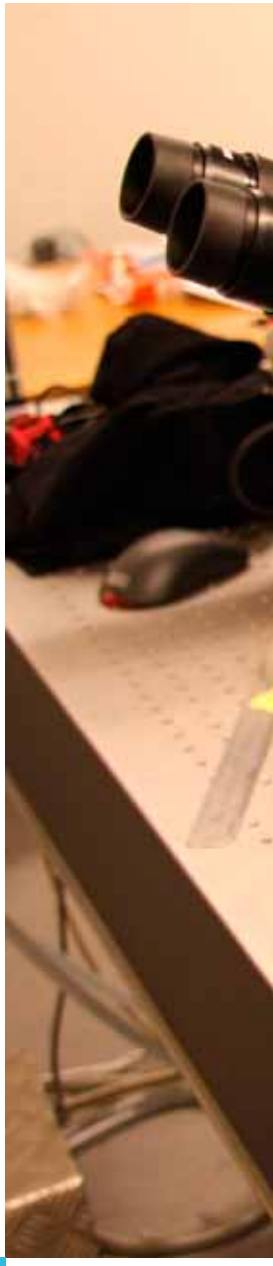
OPTICS AND SURFACE SCIENCE LABORATORIES

The laboratories complement the cleanroom. They focus on thin film deposition and photonics, with special emphasis on materials treatment, spectroscopy, microfluidics, and optic technologies.

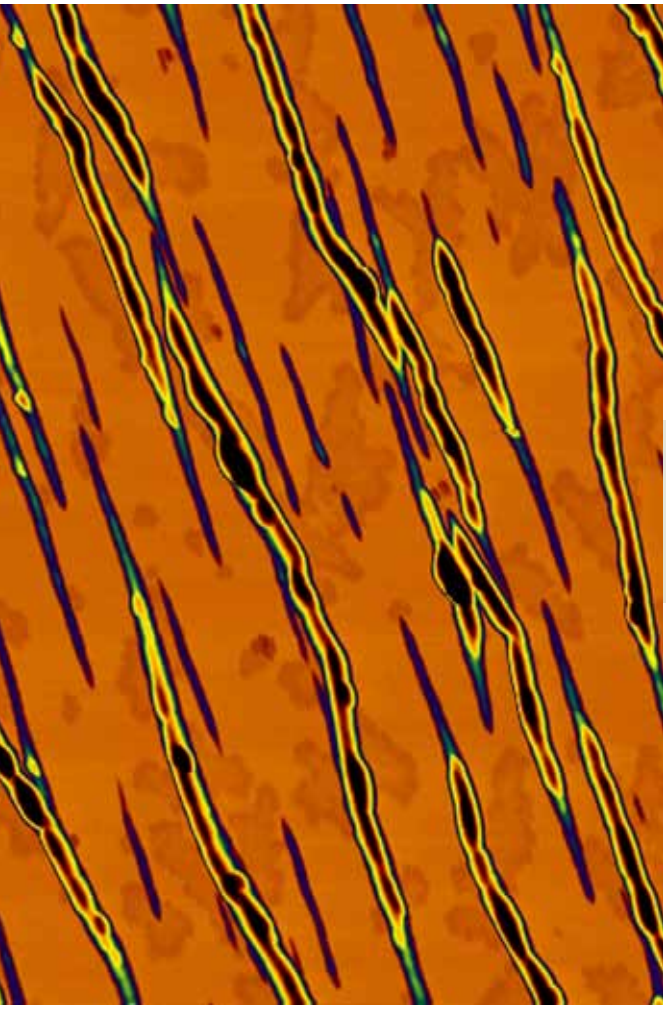
SURFACE SCIENCE: SMART THIN FILMS

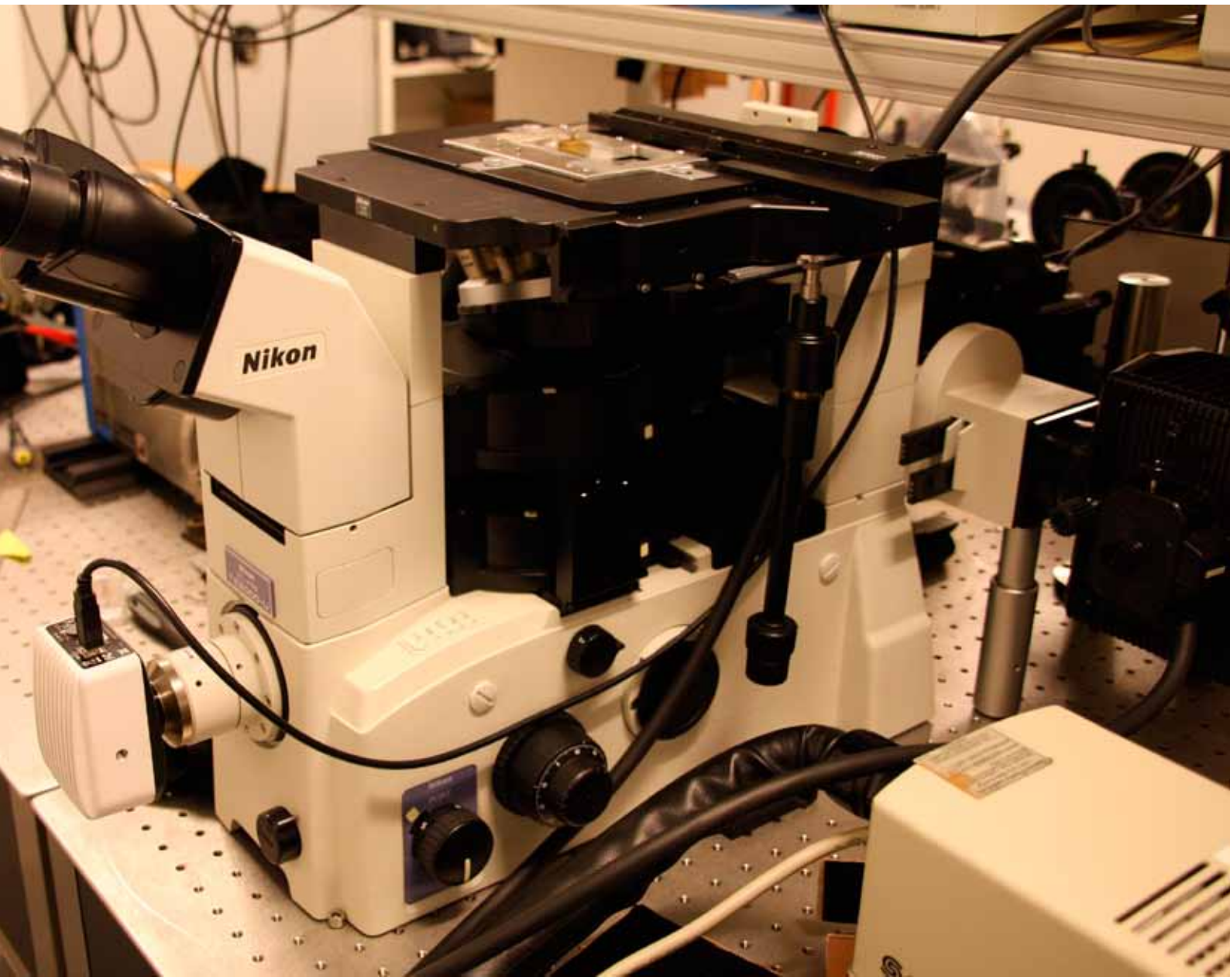
The surface science laboratory hosts ultrahigh and high vacuum thin film deposition apparatus with state-of-the-art surface characterisation equipment. Ultra thin films and nanoaggregates from metals, semiconductors, and dielectrics are grown with focus on discontinuous organic thin films and surface microstructure controlled growth of nanoaggregates.



NANOOPTICS AND LASER PHYSICS

Available equipment includes continuous wave, fast (nanosecond) and ultra-fast (femtosecond) laser sources, a scanning near field optical microscope, spectrometers, and a femtosecond laser scanning microscope. Nanofibers of various kinds are investigated both in the optical near field and the far field as, e.g., new laser sources, nanoscale frequency doublers, or as active elements in plasmonic circuits.





MICROSCOPY AND MICROFLUIDICS

A combined inverted epifluorescence and atomic force microscope allows for a simultaneous optical and nanoscopic view of structures and processes at very small scales. A second epifluorescence microscope with accompanying spectrometers enables one to obtain high resolution, spectrally resolved optical images of surfaces and surface structures. Microfluidic elements are fabricated in a rapid prototyping process from Silicone and are integrated into lab-on-chip platforms including laser-based on-chip excitation and detection via optical sensors.

PROFILE IN NANOTECHNOLOGY: BACHELOR AND MASTER STUDIES

The nanotechnology education at University of Southern Denmark, NanoSYD, is based on the bachelor and master part of the mechatronics engineering programme. During the bachelor and/or master part, students get access to state-of-the-art micro- and nanotechnology fabrication laboratories, the cleanroom facilities included.

Students can enter the nanotechnology profile in the bachelor part, but also just in the master part. A transition semester provides the necessary basic course content in order to successfully follow the master part.

A large number of foreign students and project activities contribute to an international and exciting educational environment.

GRADUATE STUDIES IN NANOTECHNOLOGY

On a graduate level, a PhD in Functional Materials and Nanotechnology can be obtained. NanoSYD is affiliated to an international network with partner universities from eleven European countries within the European Graduate College PCAM (Physics and Chemistry of Advanced Materials).

Read more about the nanotechnology education on NanoSYD's homepage.

CROSS-BORDER COLLABORATION

In accordance with the centre's mission and its location close to the Danish-German border, NanoSYD is part of various international academic and industrial networks. It has collaboration partners in Austria, Brazil, England, France, Germany, Italy, Lithuania, Poland, Russia, Spain, Sweden, and the USA. Especially strong relationships exist with the neighbouring universities in Flensburg, Kiel, and Oldenburg, with industrial clusters in Southern Denmark, and with technology transfer organisations in Schleswig-Holstein.

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University of Southern Denmark

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