

NINa-News

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Dear Reader



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Prof. Dr. Matthias Rehahn

we are currently experiencing profound processes of change, from the climate to our industrial structure and global trade, and far into our daily lives. Adapting to these changes, however, is highly complex due to the strong interconnect- edness of a wide variety of sectors and can only be successfully achieved by working together. It is

essential to develop strategies for the future that take into account very different perspectives, competencies and disciplines.

How do we deal with environmental changes? How do we arm ourselves against the challenges of climate change? We need resilience. New technical solutions also need resilient materials, for example for mechanical and automotive engineering or aviation, medical technology and energy storage. And ultimately, what we research and develop must make a difference in politics, business and society, i.e. lead to actual innovations.

Based on this realization, the [Helmholtz-Zentrum Hereon](#) has completely reorganized itself. At the end of March, the new orientation was publicly expressed with a change of name and the former Helmholtz-Zentrum Geesthacht - Center for Materials and Coastal



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Research on offshore wind power: Hereon is also working on solutions to the challenges of climate change.

Research was renamed Helmholtz-Zentrum Hereon.

The name Hereon is composed of the terms „Helmholtz“, „resilience“ and „innovation“ and is derived from core messages of our current mission. The central guiding principle of this change is to bring together the competencies represented at the Center in the areas of materials, coast and climate in such a way that, together and in close cooperation with industry and society, they enable highly innovative solutions.

Hereon's scientific spectrum includes high-performance materials, processes and environmentally friendly technologies for mobility and new energy systems. It also conducts research into biomaterials for medicine and for enhancing the quality of life. With the help of its research and consulting services, Hereon meets the challenges of climate change and enables sustainable management and protection of the coastal and marine environment through a comprehensive scientific understanding. Understand fundamentally, apply practically - Hereon's interdisciplinary research spectrum covers a unique range.

Prof. Dr. Matthias Rehahn
Scientific and technical managing director
Helmholtz-Zentrum Hereon

Wir fördern Wirtschaft



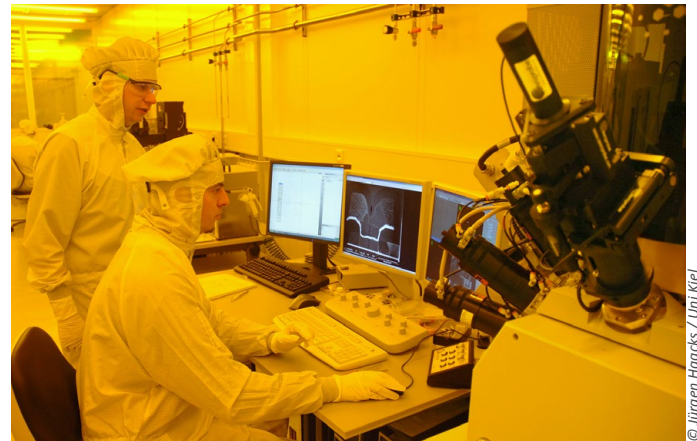
Landesprogramm Wirtschaft: Gefördert durch die Europäische Union - Europäischer Fonds für regionale Entwicklung (EFRE), den Bund und das Land Schleswig-Holstein

Schleswig-Holstein. Der echte Norden.

The Next Generation of Medical Sensor Technology and Information Processing at Kiel University

Researchers at Kiel University are working on new diagnostic techniques for heart and brain diseases and on biologically inspired information processing. For this purpose, two Collaborative Research Centers (CRC) received funding of 25 million euros.

The functions of the heart and brain are based on the flow of electrical currents. As a supplement or alternative to conventional electrical measurement methods such as ECG or EEG, magnetic measurements could enable significantly better spatial resolution and facilitate long-term examinations. Since the start of [CRC 1261](#) in 2016, scientists from materials science, electrical engineering and medicine have been researching highly sensitive diagnostic methods based on magnetic field measurements. „With our unique research approach, we have built up great internationally visible expertise in recent years,“ says CRC spokesperson [Professor Eckhard Quandt](#). „If we can further develop our sensor concepts for broad medical use, they can be used to

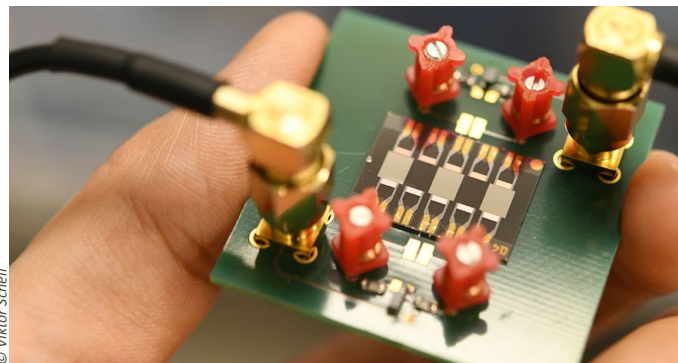


The materials and structures for both CRCs are being developed in the clean room of the Nanolab at Kiel University.

detect cardiological or neurological diseases that have so far been impossible to recognize with electrical measurements.“ To this end, the company Boston Scientific, international market leader in the field of deep brain stimulation, among others, has now strengthened the interdisciplinary alliance. In addition, the University Hospital Schleswig-Holstein, the Fraunhofer Institute for Silicon Technology in Itzehoe and the Leibniz Institute for Science and Mathematics Education Kiel are involved in CRC 1261.

Applications also play a major role in [CRC 1461](#) from the research area „Bioinspired Electronics“: although computers are becoming increasingly powerful, the human brain functions far more efficiently in comparison, especially when it comes to cognitive abilities such as pattern or speech recognition. „Biological processes, such as information pathways in nervous systems, can be valuable models for new hardware in technical information processing,“ says CRC spokesperson [Professor Hermann Kohlstedt](#), explaining the innovative approach. „By incorporating evolutionary biological mechanisms, we hope to make significant advances for information processing.“ This could set the stage for a new generation of computers and technologies in areas such as sensor technology, robotics and autonomous driving, or decisively advance the development of bionic prostheses. This requires close cooperation between neuroscience, biology, psychology, physics, electrical engineering, materials science, network science and nonlinear dynamics. In addition to Kiel University as the host institution, eight other universities, non-university research facilities and university hospitals are involved in the CRC 1461.

The double funding commitment for both CRCs also strengthens nanoscience in northern Germany, as both projects are located in the research focus KiNSIS „Kiel Nano, Surface and Interface Science“ at Kiel University.



Magnetic field sensors could be used to measure heart and brain activities even more precisely than electrical measurement methods. In the second funding phase of SFB 1261, the focus is even more on medical applications.



Professor Hermann Kohlstedt (left) is the spokesman for the new CRC 1461, in which his research group is developing memristive devices. Professor Eckhard Quandt is the spokesman for CRC 1261 and Vice President for Research at Kiel University.

Bridging the gap between research and application

To accelerate innovation and train the next generation of engineers, a unique public-private partnership decided in 2017 to establish the [Centre for Industrial Electronics \(CIE\)](#) as part of the Faculty of Engineering at the [University of Southern Denmark \(SDU\)](#). Today, the CIE is located in Sonderburg near the Danish-German border.



© Centre for Industrial Electronics

The Centre for Industrial Electronics (CIE) supports the electronics industry in the areas of research, technology development and education. The research focus is based on the trends of industry and society towards electrification, digitalization and efficient green energy.

The unique profile of the CIE results from bringing together the academic and industrial perspectives. An international team of 24 researchers and engineers with their industrial background understands the needs of companies and markets while conducting excellent research. The developers apply these competencies to their research agendas, which bridge the gap between basic research, technology development and application.

A wide range of areas are addressed at CIE, such as electromagnetic compatibility, energy storage and microgrids, intelligent systems, motors and control, passive components, power converters and reliability. In addition, practical challenges such as pre-compliance

testing, failure analysis and quality assurance are solved.

The CIE is collaborating with, among others, colleagues at the nanotechnology research center SDU NanoSYD on the development of supercapacitors and new electrolytic and metallized film capacitors. The integration of micro- and nanotechnology paves the way for the development and optimization of new components and materials such as GaN and SiC in power semiconductors or new polymer electrolytes for capacitors. Advanced equipment such as an X-ray nanotomograph and a helium-ion microscope enable non-destructive analysis of materials and structures or to cross-cut samples on the nanoscale.

The CIE's strong international partnerships with organizations such as the European Center for Power Electronics or the Power Electronics Network Schleswig-Holstein form the basis for cutting-edge research which makes a difference in the industrial world.



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The international team at the Centre for Industrial Electronics in Sonderburg, Denmark, is at home in both research as well as industrial application.

Nanotechnology and Innovation from Gothenburg

Virtual symposium | May 11, 2021 | free participation

For years, Sweden has been one of the world's leading countries in research, innovation, technology and economic competitiveness. Within R&D, the country holds a strong position in nanotechnology. In particular, the city of Gothenburg with its two universities plays a key role in this field.

Cutting-edge activities of these two universities in the field of nanotechnology will be presented in the symposium „Nano-

technology and Innovation from Gothenburg“, organized by [Prof. Dr. Alexandre Dmitriev](#) from the University of Gothenburg and [Prof. Dr. Uta Klement](#) from Chalmers University of Technology together with NINA SH.

Look forward to stimulating lectures, interdisciplinary discussions and initiation of joint activities. Free registration and more information about the event can be found at gothenburg21.nina-sh.de.



Prof. Dr. Alexandre Dmitriev from the University of Gothenburg and Prof. Dr. Uta Klement from Chalmers University of Technology will moderate the program of the virtual symposium.

Virtual Conference NIBS

The international conference series [Nanotechnology and Innovation in the Baltic Sea Region - NIBS](#) virtually proceeds into the fourth edition from August 4 to 6.

NIBS brings together research and industry from the Baltic Sea region to connect the latest achievements in research and innovative solutions in the field of nanotechnology.

The conference provides an ideal opportunity to increase visibility as a scientist, company or other actor in the field of nanotechnology within the Baltic Sea region. An active regional and international nanotechnology network provides the perfect stage to find



NIBS
conference 2021
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new project partners or customers.

Participation in the virtual conference is free of charge, registration is required. For more information, visit the conference website at nibs.nina-sh.de. The conference is organized by CAU Kiel, Southern Danish University SDU, Kaunas University of Technology KTU and NINA SH.

Maritime Innovation Hub TransMarTech S-H



The view across the fjord from Kiel's Seefischmarkt fits the mission of [TransMarTech](#): founded in 2020, the center is an incubator for maritime innovations and technologies. With a diverse range of services and infrastructure, it promotes the transfer from maritime science to product development. Companies are enabled to use the excellent and diverse research infrastructure in Schleswig-Holstein if

required. „TransMarTech offers the opportunity to strengthen the innovative capacity of the country as a new type of technology transfer structure. It is important to me that companies make even greater use of the excellent scientific facilities and that threshold fears are reduced,“ says Dr. Bernd Buchholz, Minister of Economics and Technology for the state of Schleswig-Holstein.

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