

## Dear Reader,



Dr. Christian Ohrt

a lot has happened in the nanotechnology community of Schleswig-Holstein and at NINa SH during the last five years. Thanks to the public grants of the EU and the state of Schleswig-Holstein, the initiative has established a Coordination Center Nanotechnology as well as an innovative, living and steadily growing network of stakeholders from nanotechnology.

That the state politics consider nanotechnology to be of significant importance is demonstrated on the one hand by the public funding of respective projects as Dr. Hansen from Kiel University reports on page 2. Besides financing we look forward to becoming supported by personal commitment from politics, too. We heartily welcome Ms. Kuchenbecker

from the Ministry of Economic Affairs, Transport, Employment, Technology and Tourism and Dr. Roß from the Ministry of Education, Science and Cultural Affairs (more on page 4).

The innovation potential of the cross-sectoral nanotechnology is extraordinary. In various kinds of events and media NINa SH informs the public of the significance of nanotechnology. The network gives small and medium enterprises, which are the backbone of Schleswig-Holstein's economy, access to the potential of interdisciplinary developments based on nanotechnology. Mr. Jopek from axiom insights tells on page 3 how motivating the establishment of a start-up can be in such an innovative environment.

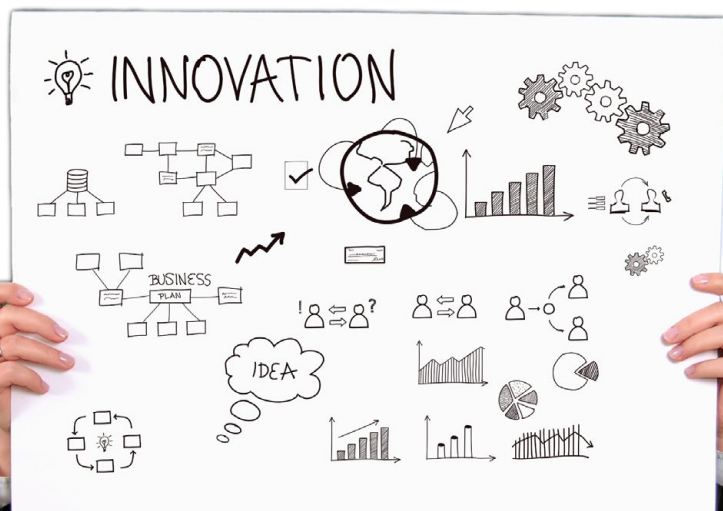
An active network will be essential to generate wealth and growth in Schleswig-Holstein based on the economic potential of nanotechnology. A tight co-operation with the neighbors in North Germany and the Baltic Sea Region is necessary so that local companies can benefit from innovations in the whole region.

Thus become part of the network, benefit from the lively exchange of our members and make use of the innovation potential of nanotechnology.

*Christian Ohrt*

Dr. Christian Ohrt

Executive manager of the North German Initiative Nanotechnology Schleswig-Holstein e.V.



### Wir fördern Wirtschaft



# EU.SH



Landesprogramm Wirtschaft: Gefördert durch  
die Europäische Union - Europäischer Fonds  
für regionale Entwicklung (EFRE), den Bund  
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**Schleswig-Holstein. Der echte Norden.**

# Funding of the next-generation energy storage

Researchers of Kiel University develop a new generation of batteries with significantly higher energy density and improved safety compared to conventional lithium ion batteries. Minister-president of Schleswig-Holstein Daniel Günther handed over the funding notice at the Technical Faculty of Kiel University on July 2<sup>nd</sup>. The two involved working groups receive a grant of approx. 2 million euros for the development and testing of the new battery systems.

Various applications like electro-mobility, aviation and stationary storage solutions demand better safety and higher energy densities than state-of-art lithium ion batteries achieve today. The innovative batteries of the researchers at the Technical Faculty of Kiel University promise to deliver these improvements. Using silicon anodes the energy density of the cells is significantly increased and at the same time fire hazard is reduced thanks to the properties of silicon. The material system additionally offers the possibility to replace lithium with other materials to avoid the partly socially and environmentally questionable mining of the light metal.

"We create optimal prerequisites for excellent research, even beyond the Technical Faculty, with the establishment of this high-end laboratory," says minister-president Daniel Günther while handing over the funding notice. The funding will be used to install an extensive battery laboratory in which [material scientists](#) and [power electronics engineers](#) from Kiel University together conduct research on the innovative batteries. "The comprehensive methods for investigating the batteries are especially important since our cells are beyond state-of-the-art," explains project leader Dr. Sandra Hansen from the working group Functional Nano Materials of the Institute for Material Science.

Regional companies benefit from the new laboratory as well since they can use the research capacities to answer their technical questions. Co-operations for research and development are already sought after by companies like [thyssenkrupp Marine Systems](#), [Jungheinrich](#) and [Danfoss Silicon Power](#) with further inquiries from national and

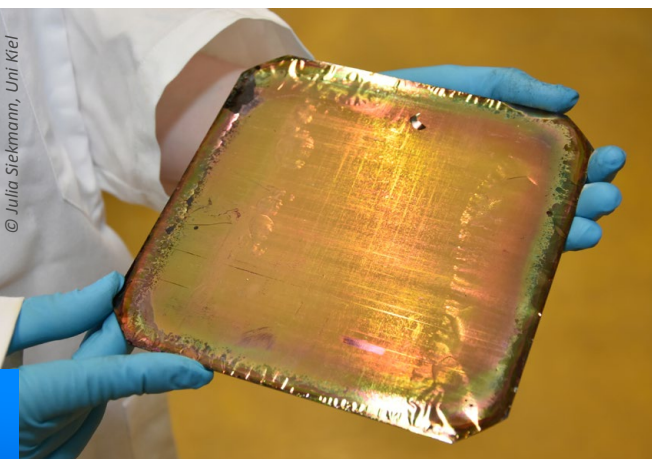


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*Even under difficult conditions minister-president Daniel Günther hands over the funding notice to Prof. Dr. Marco Liserre and Dr. Sandra Hansen. Back row: Prof. Dr. Lorenz Kienle, Dean of the Technical Faculty and Prof. Dr. Ilka Parchmann, vice president of Kiel University.*

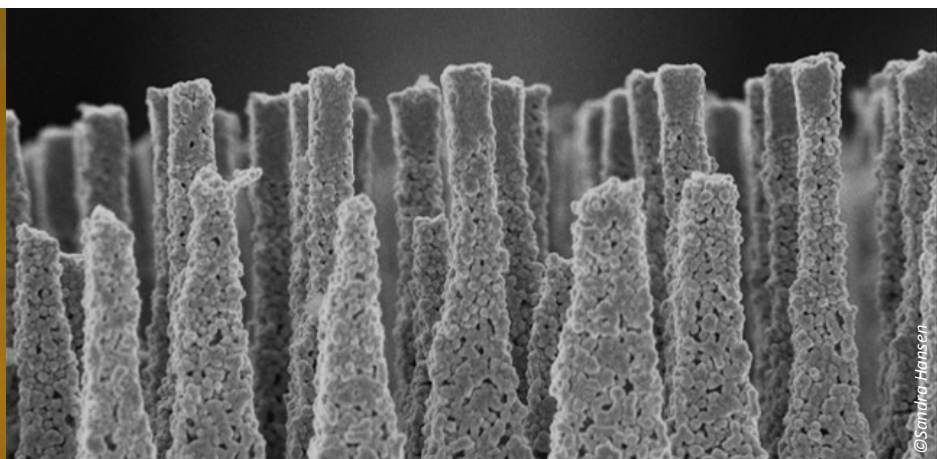
international ventures being made. Besides industry the laboratory will intensify the co-operation between regional research organizations like the [Fraunhofer Institute for Silicon Technology ISIT](#), too. "The industrial interest is extraordinary. We receive inquiries from all over the world," says Dr. Hansen regarding the economic potential of her battery technology. "After all, we are still in the development phase and one cannot buy our cells tomorrow. However, we expect the batteries to be market-ready in a few years time."

Besides the new batteries themselves suitable electronics like power rectifiers are necessary for the integration of a storage system into a realistic working environment. Such power electronics will be developed by researchers led by Professor Marco Liserre from the Chair of Power Electronics of the Technical Faculty. Dr. Hansen looks forward to the interdisciplinary co-operation, "I am particularly glad that we can combine our competencies regarding material science and electronics in Schleswig-Holstein and jointly use them in the new project."



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*An etching procedure forms a porous surface on silicon which can subsequently be joined very well to an electrode made of copper.*



©Sandra Hansen

*Silicon expands by 400 per cent during the charging cycle of a battery, leading to mechanical breakdown of the cell. Dr. Hansen solved the problem using silicon micro-wires which she investigated during her PhD.*



# New cures thanks to brilliant x-rays

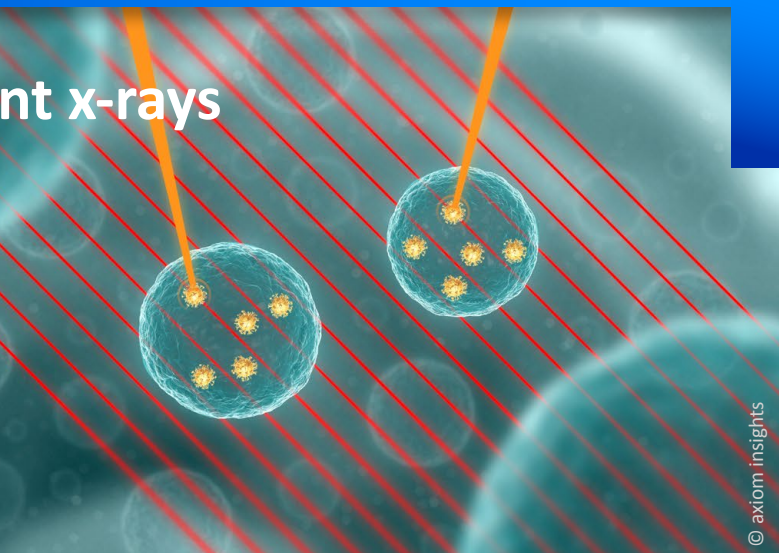
With a new measurement technique for in-vivo imaging [axiom insights GmbH](#) tackles the challenge to develop new pharmaceuticals successfully and fast.

"These crazy times forced us to question accustomed habits and think about new solutions. I wish the same regarding our new measurement technique," says Marc Jopek, CEO of axiom insights. The start-up based in Hamburg aims to enable the development of new cures using an innovative imaging technique.

There are already various established methods for in-vivo diagnosis like CT, MRT or PET. However, the x-ray fluorescence imaging from axiom insights combines several individual advantages of the other techniques, thereby accessing previously not available data.

The imaging is based on tracer nanoparticles or molecules which are excited in a sample by x-rays from a synchrotron source. Subsequently the tracers relax from the excitation by emitting x-rays themselves, which then become the imaging signal. "DESY with its x-ray source PETRA III is an ideal location for us. There are only few x-ray sources of such brilliance worldwide," explains Jopek. Advantages of x-ray fluorescence imaging are unlimited depth of field and observation period, higher sensitivity compared to CT and MRT as well as a spacial resolution below one millimeter, amongst others. This enables the space- and time-resolved in-vivo study of the distribution of drugs, viruses or immune cells for example to ensure the concentration of pharmaceuticals at the desired place.

In Jopek's opinion there have been only but a few ground-breaking developments in the pharmaceuti-



© axiom insights

*Synchrotron radiation (red) excites nanoparticles which then emit x-rays themselves (orange). They are the imaging signal of axiom insight's x-ray fluorescence technique.*

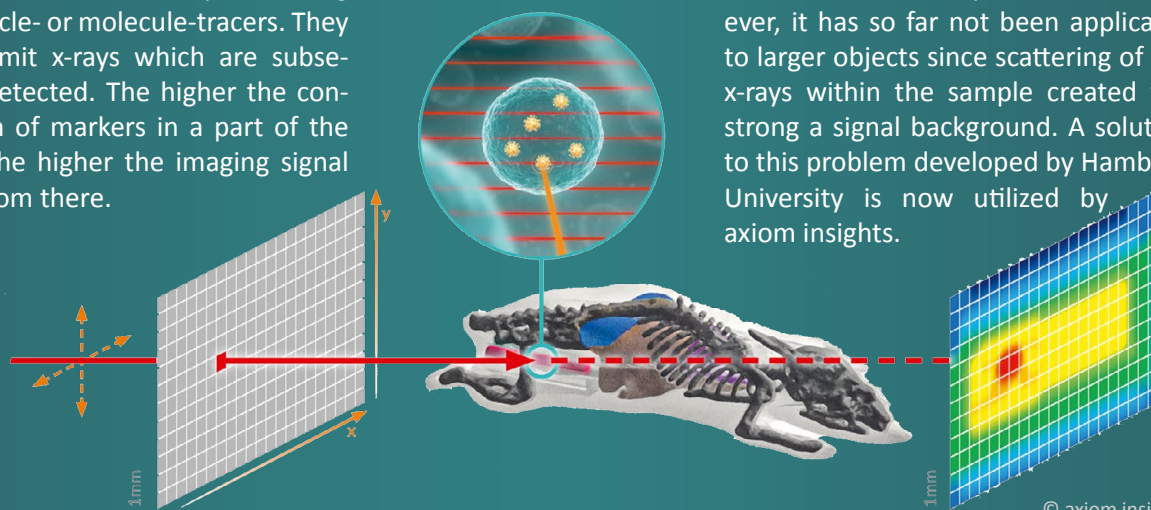
cal industry in recent years. However, he sees huge potential in the improvement of existing therapies by pharmaceutical individualization using functionalized nanoparticles. "For me the exchange between the very different disciplines which co-operate in the broad field of nanotechnology is very exciting and stimulates innovation. Networks like NINa SH and Life Science Nord are great opportunities to get into touch with relevant stakeholders," says Jopek.

While axiom insights focused so far on technology development, the company now intensifies the acquisition of customers to promote the application of the technique.

Jopek is optimistic, "When developers from the pre-clinical sector question the status quo and give our new technique a try, it will be possible to find cures for example for Crohn's disease, multiple sclerosis, HIV or Alzheimer's disease more directed with our imaging data."

## The x-ray fluorescence technique

An x-ray beam from a synchrotron source scans the sample, exciting nanoparticle- or molecule-tracers. They in turn emit x-rays which are subsequently detected. The higher the concentration of markers in a part of the sample, the higher the imaging signal coming from there.



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# NINa SH more digital and with new experts

New website | Virtual member meeting | New experts supporting NINa SH

Co-operation and networking via the internet is currently more important than ever before and yields advantages even beyond the Corona-crisis. Thus NINa SH invited to its first virtual meeting of members on July 29<sup>th</sup> via the video conferencing platform Zoom.

According to the signs of the times NINa SH refurbished its web presence under [www.nina-sh.de](http://www.nina-sh.de). The website was completely overhauled and now offers a new design and optimized layout especially for mobile friendly display.

During the meeting of members PD Dr. Ralf Zimehl was voted the new treasurer of NINa SH. Mr. Zimehl formerly was member of the board of curators of the initiative in which the former treasurer Dr. Jens Urny now supports NINa SH. The board of curators is additionally

reinforced by Ms. Kuchenbecker and Dr. Roß, both working in ministries of Schleswig-Holstein.

Ms. Kuchenbecker is responsible for Nanotechnology in the section technology policy and technology transfer of the Ministry of Economic Affairs, Transport, Employment, Technology and Tourism.

Dr. Roß leads the section university affairs, international and European affairs and technology transfer in the Ministry of Education, Science and Cultural Affairs.

Prof. Dr. Scherließ from Kiel University as well joins the board of curators where she reinforces NINa SH with her extensive life science competencies.

These developments reflect the mission of NINa SH - to interlink science, industry and politics in the cross-sectoral field of nanotechnology.



Kerstin  
Kuchenbecker



Prof. Dr. Regina  
Scherließ



PD Dr. Ralf Zimehl



Dr. Bernd Roß

## Highlights from the community

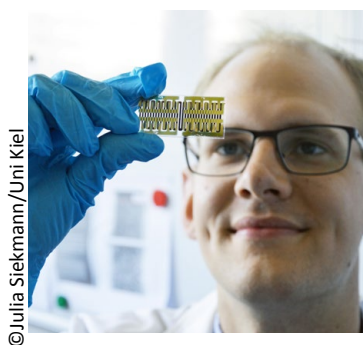
On this page, NINa SH presents recent highlights from the field of nanotechnology and news from science and industry. You can inform the network about your activities here, too. [Send your highlight to info@nina-sh.de](mailto:info@nina-sh.de).



### Demonstration of hydrogen-based energy transition

The [BMW supports the Reallabor Norddeutschland](#) which will demonstrate the transformation of the energy system towards sustainability under realistic conditions. About 50 partners co-operate in the region of Schleswig-Holstein, Hamburg and

Mecklenburg-Vorpommern in 25 projects with the focus on hydrogen and energy efficient quarters. The projects with a total volume of 350 million euros shall evaluate how to reduce the CO<sub>2</sub> emissions of the region by 75 per cent until 2035.



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### Gas sensors for acetone from the 3-D printer

Researchers from [material science at Kiel University](#) and from [biomedical technology at Technical University of Moldova](#) report in the [journal Nano Energy](#) on a gas sensor for acetone which is manufactured by 3-D printing. The sensor is based on nano-structured particles which re-

act with the targeted gas. The scientists see an application for example for diabetics who might be able to determine their level of blood sugar by measuring the fraction of acetone in their breath. The principle of the sensor can be used for other target gases like hydrogen as well.

## Impressum

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