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EXCELLENCE

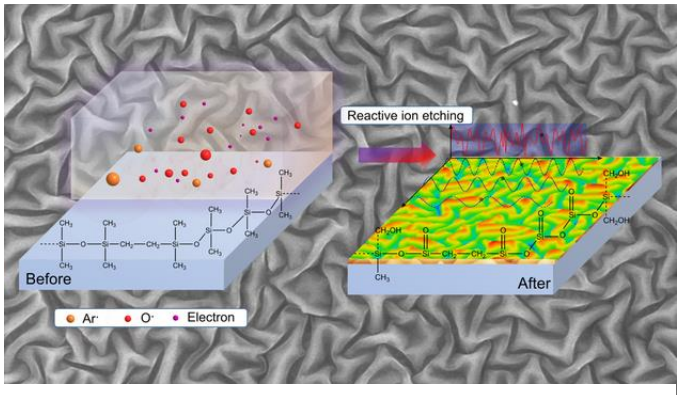
TU Dresden Retains Its Title as University of Excellence →

© TUD/Sven Geise

TU Dresden has received permanent funding as a University of Excellence! This was announced by the German Council of Science and Humanities. TU Dresden is one of a total of 11 Universities of Excellence in Germany. At TU Dresden, the result was met with euphoric applause. The Rector, Prof. Hans Müller-Steinhagen, emphasised the importance of this title for the strategic development of the university: "We have been funded as a University of Excellence for seven years and, thanks to the measures realised with this support, we have managed to join the ranks of Germany's top universities. For example, we have used that funding to attract top national and international scientists to TU Dresden, optimise our structures and processes, and intensify cooperations with non-university research institutions within the DRESDEN-concept alliance. Our new strategy for the coming years until 2028 was based on these achievements and convinced the reviewers of our merits and potential. I would like to thank everyone involved in the preparation of the proposal and in the participation of the on-site assessment!"

RESEARCH

Physicists Use Nanostructures to Free Photons in White OLEDs →



© Sebastian Reineke et al., Nature Communications: CC BY 4.0

Around 20 percent of the photons generated in organic light-emitting diodes (OLEDs) remain trapped in the glass layer of the components. An international team of researchers led by **Dr. Simone Lenk** and **Prof. Sebastian Reineke** from TU Dresden presented a new method for freeing the trapped light particles to increase light efficiency in the journal Nature Communications.

OLED research focuses in particular on improving the performance of white OLEDs for lighting elements. The external quantum efficiency for white OLED components without additional outcoupling techniques can only reach 20 to 40 percent today. The total internal reflection of the light particles at the interface between glass and air retains 20 percent of the photons. The TUD physicists have developed a facile, scalable and especially lithography-free method for the generation of controllable nanostructures with directional randomness and dimensional order, significantly boosting the efficiency of white OLEDs. The nanostructures are produced by reactive ion etching. "We had been looking for a way to specifically manipulate nanostructures for a

long time already. With reactive ion etching, we have found a cost-effective process that can be used for large surfaces and is also suitable for industrial use," says Dr. Simone Lenk.

Thermal Molecule Trap: New Experimental Approaches to the Investigation of the Molecular Causes of Amyloid Formation →

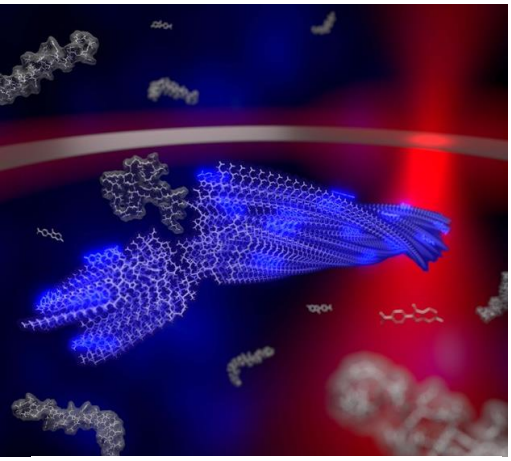


Illustration of a growing fibril in the trap
© Martin Fränzl

The molecular causes of neurodegenerative diseases such as Alzheimer's or Parkinson's have so far been little researched. In the journal Nature Methods, a team of scientists from the University of Leipzig, the TU Dresden and the Kurt-Schwabe-Institut Meinsberg presented a new technique to get to the bottom of these molecular mechanisms: a thermal molecule trap. According to **Michael Mertig**, Professor of Physical Chemistry, Measurement and Sensor Technology at the TU Dresden and Director of the Kurt-Schwabe-Institut für Mess- und Sensortechnik e.V. Meinsberg, the work shows "the enormous potential of the development of miniaturized photonic analysis systems for medical diagnostics".
Researchers assume that the aggregation of small protein molecules, the peptides, is the cause of such diseases. How individual peptides become smaller and sometimes toxic aggregates and finally fibrils is difficult to observe experimentally. Using a thermal trap, the team was able to capture fibrils in physiological solutions over several hours under the microscope and observe their growth, break-up and further growth of the fragments: The aggregates were trapped in a heated metal ring, where they can be driven in any direction by temperature differences. The movement of the fibrils can also be tracked and mathematically analyzed, and their change in size can be observed to within a millionth of a centimeter.

Nobel Laureate Takaaki Kajita Unveils Dresden Accelerator →

What exactly goes on inside stars? Thus far, it was only possible to search for answers at two locations. After two years of construction, a third research facility has now been completed: The Felsenkeller Laboratory, established in a joint venture by the Helmholtz-Zentrum Dresden-Rossendorf (HZDR) and TU Dresden, was inaugurated on 4th July. The research facility, located on the south-western outskirts of Dresden in a former storage site of the Felsenkeller brewery, was unveiled by **Professor Takaaki Kajita**, winner of the Nobel Prize in Physics from the University of Tokyo. "The underground accelerator in the Felsenkeller will be a valuable tool for understanding the origin of the elements in the universe and for making more precise predictions about neutrino flux from the Sun," said Kajita at the opening ceremony for the ion accelerator, which is located below a layer of rock at a depth of 45 metres. "Since this facility is available to scientists from all over the world, the entire community of nuclear astrophysicists will benefit from it. As a neutrino and gravitational wave

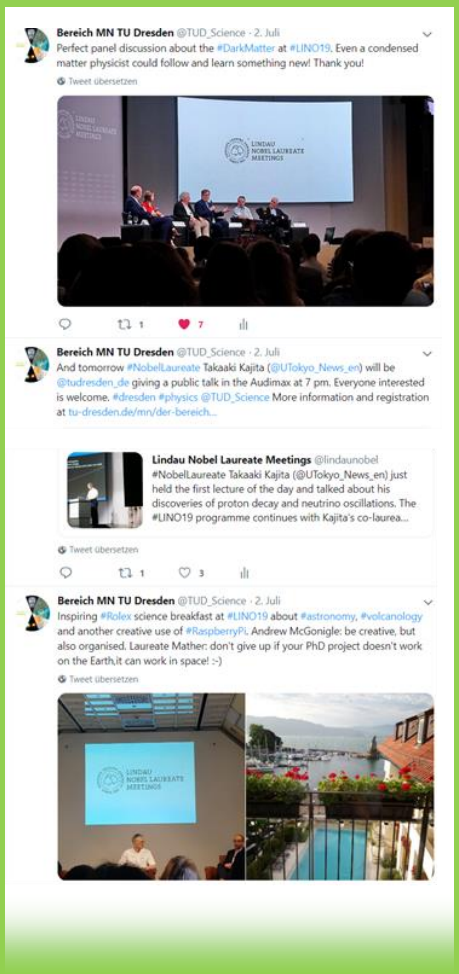
Left to right.: Daniel Bemmerer (HZDR), Gerhard Rödel (TUD), Takaaki Kajita (University of Tokyo), Thomas Cowan (HZDR), Kai Zuber (TUD) © HZDR/André Wirsig

SOCIAL MEDIA

Live at Lindau via Twitter →

Dr. Helena Reichlova, scientific assistant at the Institute of Solid State and Materials Physics, was one of 580 young scientists from 89 countries who had the opportunity to take part in this year's Lindau Nobel Laureate Meeting. She shared her experiences on the Twitter channel of the School of Science.

"My strongest impression was that every single participant of the meeting I spoke with, regardless if Nobel Price winner or a young student, shared the same positive and idealistic fascination by science.
The Lindau meeting has a very special encouraging atmosphere which can ensure and boost motivation of young researchers that working in science is meaningful and there is enough like-minded people."



Helena @TUD_Science

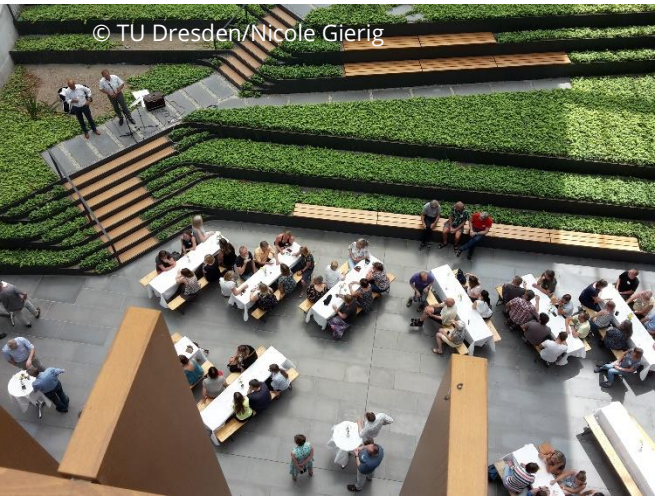
2.7.: Perfect panel discussion about the #DarkMatter at #LINO19. Even a condensed matter physicist could follow and learn something new! Thank you!

physicist, I am really looking forward to seeing new data from the Felsenkeller underground accelerator."

Tuning the Energy Levels of Organic Semiconductors →

Physicists from the Dresden Integrated Center for Applied Physics and Photonic Materials (IAPP) and the Center for Advancing Electronics Dresden (cfaed) at the TU Dresden, together with researchers from Tübingen, Potsdam and Mainz were able to demonstrate how electronic energies in organic semiconductor films can be tuned by electrostatic forces. A diverse set of experiments supported by simulations were able to rationalize the effect of specific electrostatic forces exerted by the molecular building blocks on charge carriers.

NETWORKED



School of Science Summer Party

It had been a summer party in the truest sense of the word: While summer heat dominated on the campus, 150 employees of the School of Science networked under the fresh green of the Biology Atrium - a successful networking event that transcended Faculty boundaries. The School of Science thanks all participants and supporters who made another successful summer highlight possible.

Prof. Leo Receives 2019 Saxon Transfer Prize →

On 19 June, Saxony's Minister of Economy Martin Dulig honoured the most innovative founders and entrepreneurs as well as the best knowledge and technology transfer projects in the state at the futureSAX Innovation Conference. Saxony's best transfer project comes from **Prof. Karl Leo** from the Institute of Applied Physics. The Saxon Transfer Prize is endowed with prize money of 30,000 euros. Prof. Leo was nominated by the winner of the Saxon Founders Prize 2016, Senorics GmbH. The Integrated Center for Applied Physics and Photonic Materials (IAPP) under Prof. Leo's leadership has been researching organic semiconductors for more than 20 years. Following numerous successful spin-offs, a patent portfolio was transferred to the most recent spin-off, Senorics, in 2018. A special new development are sensors that allow non-contact and highly accurate distance measurement.

Femtec Exchange Forum: MINT Students Networked →

On 25th June past and future Femtec scholarship holders of the School of Science met with equal opportunity officers of the faculties to get to know each other and to share their experiences with the Career Building Programme. This ideal scholarship from three schools during semester breaks offers MINT students information about career paths, workshops with experienced training personnel, company fairs and excursions to potential employers as well as individual support, career advice and guidance for career entry.
A particular challenge within the approximately 400 hours of the program are the project tasks coming from day-to-day corporate life within the framework of the Innovation Workshop. Female students can apply to Femtec.GmbH, ideally in the 5th/6th semester of their Bachelor's degree or in the first two semesters of their Master's degree.

Helena @TUD_Science

2.7.: Inspiring #Rolex science breakfast at #LINO19 about #astronomy, #volcanology and another creative use of #RaspberryPi. Andrew McGonigle: be creative, but also organised. Laureate Mather: don't give up if your PhD project doesn't work on the earth, it can work in space! :-)

Helena @TUD_Science

1.7.: Technical difficulties (all figures gone) turned the #LINO19 poster flashes of young scientists into #improvisation excersice. But they are all doing extremely well! #respect

Helena @TUD_Science

1.7.: After the first morning at #LINO19 it almost feels like a genuie sense of humor is a requirement to get a Nobel price. Especially Laureate Phillips or Laureate Novoselov made the audience laugh many times.. #scieceisfun

Helena @TUD_Science

1.7.: First talk of today, amazing, full of energy.. Donna Strickland. #LINO19 one of the very few female Laureates. But seeing the audience, where almost half of the young scientists are females, maybe the Laureates ratio will also change.. #WomenInSTEM #womeninphysics

Helena @TUD_Science

30.6.: Excellent #LINO19 opening speech of Laureate Schmidt. Some of many thoughts: Be maximally open about our research to advance science, share data, codes and ideas... Be aware of our biases and think slow...

More: twitter.de/TUD_Science →

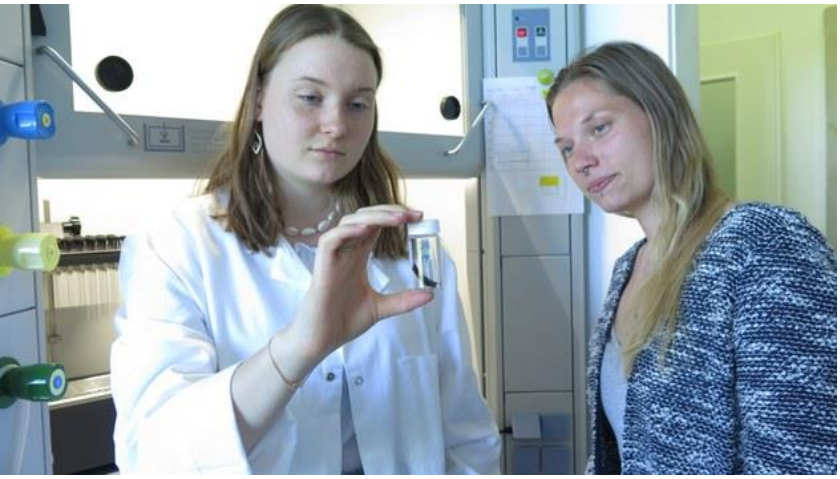
Do you have an event or news coming up or in mind you want to share with the School of Science's Twitter followers? Please contact us!

In the Splendour of the Alma Mater: Anniversary Certificates for Alumni

At the TU Dresden there is now the opportunity to honour alumni with diamond, gold or silver diploma certificates and thus strengthen the relationship between alma mater and alumni. The anniversary certificates can be inquired with the Alumni Relations Officer Susann Mayer.

YOUNG SCIENTISTS

Interviewed: PhD Student Nicole Rothe Supervises a Special Learning Achievement →



Emilia (links) and Nicole Rothe (rechts) at the Chair of Biopsychology's laboratory © Nicole Gierig

Nicole Rothe is a research associate and PhD student at the Chair of Biopsychology at the TU Dresden. For more than two years she has been researching the psychological consequences of stress and burnout for her doctorate. As part of the TU Dresden's multiplier program, she promotes committed and motivated teaching at the TU Dresden. For almost a year, the biopsychologist has also been the supervisor of a Special Learning Achievement ("Besondere Lernleistung" – BeLL) for a high school senior. She shows herself extremely impressed by this experience – as well as by Emilia, the student she supervises from the Sankt Afra Gymnasium, who deals with stress at schools as part of the BeLL. In the laboratory, where Emilia examines hair samples for her study, both were available for an interview.

International, Interdisciplinary: Master's Thesis on Medical Imaging Awarded the Professor Schwabe Prize →

© Christopher Schutzeichel

From physical chemistry to biomedicine, from TU Dresden to MIT and back again: **Sandra Heckel** worked on emitters for medical imaging in the short-wave infrared range (SWIR) in Boston as part of her master's thesis. For her work, she was awarded the Professor Schwabe Prize for outstanding master's theses and dissertations on physical-chemical or electrochemical topics. The autofluorescent properties of tissue cells as well as the scattering of the light in them set limits for fluorescence tomography in the depth of penetration - with increasing tissue depth the resolution decreases, human organs cannot yet be sufficiently imaged by the technology. Short-wave infrared light at a wavelength of 1000 to 2000 nanometers offers a solution. However, SWIR technology requires bright, high-quality short-wave infrared emitters that enable high-resolution videos. This was the starting point for Sandra Heckel's master thesis. Alexander Eychmüller, Professor of Physical Chemistry at the TU Dresden, referred the student to Prof. Moungi Bawendi's group at the Massachusetts Institute of Technology (MIT) for her thesis. In the meantime, Sandra Heckel is working as a doctoral student in Dr. Juliane Simmchen's junior research group in Physical Chemistry at the TU Dresden on photocatalytic microswimmers - micrometer-sized particles that are set in motion by light and can thus be used in sensor technology, water treatment or medical transport – and their communication for sensor applications.

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