Vivid discussions during the NIM Conferences (see p. 6)

Nanosystems NEWS

An eventful year

This year, the Nanosystems Initiative Munich will celebrate its twelfth anniversary.

The achievements of the past years will be honored, and the perspectives regarding the "future of nanoscience" discussed during a glamorous conference in Tutzing this coming September.

Picture: Evangelische Akademie Tutzing

As illustrated in this current issue of our Newsletter, nanoscience in the NIM research groups is in full bloom. Through our highly collaborative network, this field of research has been deeply rooted in the science landscape in and around Munich and Augsburg.

The topics are manifold and diverse: besides fundamental findings regarding the phenomenon of diffusion in corrugated channels, this time we report about high-frequency quantum sensors relying on single missing atoms in a diamond chip.

Important tasks of this excellence cluster are the support of the projects on the one hand, and providing a perfect working environment for the scientists on the other. Therefore, we discuss the various support programs to balance family and scientific career.

Another key task of NIM lies in the organization of a wide variety of scientific and public events in the field of nanoscience. One highlight was the "NIM NanoDay", which took place in parallel to the Munich "Street Life" festival during past September.

We also would like to cordially welcome our new scientific members – i.e. the expert in 'renewable energies' Ian D. Sharp, and Olivia Merkel, a nano pharmacist, developing highly efficient targeted therapies for tomorrow's medicine.

Enjoy reading!

Friedrich Simmel
NIM Co-Coordinator

Content

3D-Rendering of a corrugated channel to model diffusion.

Diffusion 2.0

Different than everybody thought

The phenomenon of diffusion is omnipresent and an important basis of many every-day processes. Diffusion plays a central role for the transport of very small particles.

The investigation of Brownian motions by Einstein, Sutherland and Smoluchowski was the foundation of all further research on diffusion processes, also for Professor Peter Hänggi from Augsburg University.
For the first time, Peter Hänggi and his research group were able to analyze and quantify hydrodynamic effects from theoretical models and experimental set-ups. Their results strongly suggest a reformulation of the existing theories on channel models.

Passing the channel

Scientists from various fields such as physics, chemistry and biology are especially interested in the transport through natural and artificial ionic channels and nanopores.
Confining boundaries are unavoidable components of all channel structures. The surfaces of such boundaries are typically not smooth but exhibit rather complex shapes.
Thus, those structural features affect the spontaneous particle zig-zag movements, jittery Brownian motions, on a molecular level: On the one hand, there are direct microparticle interactions with the environment, boundaries and surrounding fluid, of attracting and repelling nature altering the transport velocity.
On the other hand, the available phase space for motions along the transport direction is limited and determines it, and therefore induces entropic effects.

Model of diffusion

Hydrodynamic effects were notoriously difficult to explore quantitatively, as the ubiquitous attracting and repelling interactions of corrugated surfaces are hard to model. Hence, so far solely entropic effects were involved in analytical calculations although they did not mirror the system in its entirety.
The new theoretical model and the experimental set-up to quantitatively determine the mean diffusion time and its variances include both, entropic and hydrodynamic components, when spherical particles immersed in water diffuse inside corrugated channels.

Time- and place-dependency of predictions

There are three main results representing new milestones for future research on small-scale motion analysis. "We could validate the entropic theory in channels that are much wider than the particle radius, and, in parallel, disprove previous simulations of narrow channels," summarizes Peter Hänggi their groundbreaking findings. "In such narrow channels, the hydrodynamic effects can substantially influence the transport velocity of particles. The mean diffusion time could be 40 % higher than the prediction of the entropic theory."
Surprisingly, the validity of the entropic theory could be restored in those narrow channels upon using an *experimentally* determined, *spatially dependent* effective diffusion coefficient instead of the Stokes-Einstein diffusion coefficient as it includes the complexity of the hydrodynamic interactions with the corrugated confinement. "We are now able to take the complex hydrodynamic interactions into account when calculating diffusion processes," explains Hänggi.

This new model, published in *PNAS*, provides the basis for future analysis of very small objects - the research on diffusion will fundamentally change!

Publication

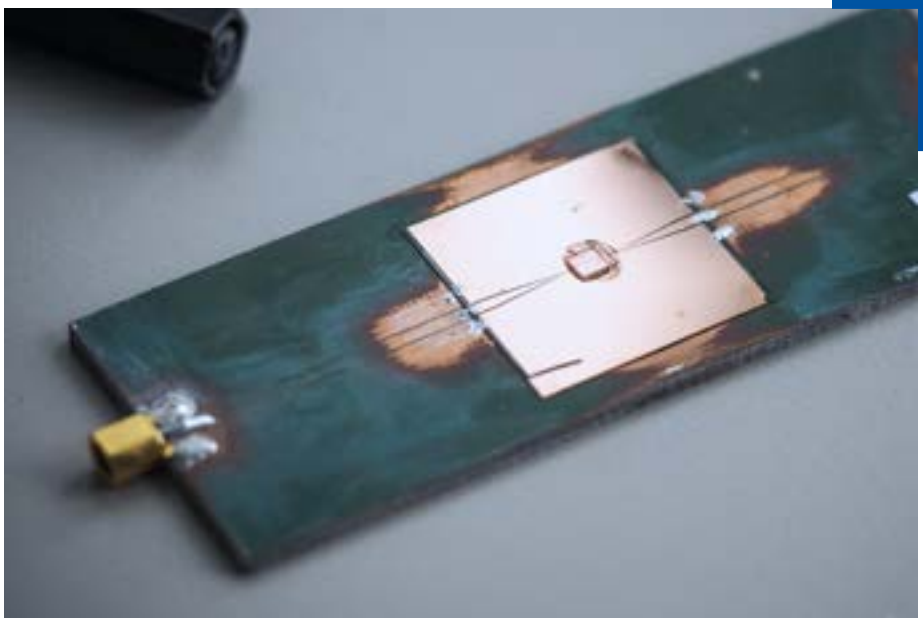
Hydrodynamic and entropic effects on colloidal diffusion in corrugated channels
Yang X, Liu C, Li Y, Marchesoni F, Hänggi P, Zhang HP.
PNAS 2017 Sep 5;114(36):9564-9569.

Pushing the limit

Quantum sensors get more sensitive

Spin-based quantum sensors can now detect high-frequency signals up to the GHz range.

NIM-scientist Dr Friedemann Reinhard and his team are the first to present the required measurement protocol in *Nature Communications*.
"It is a new approach to utilize single solid-state spins as highly sensitive detectors in the high-frequency range," Reinhard summarizes their advancement. "On this basis, single microwave photon and single phonon detectors, relevant for sensors, radio astronomy and quantum communications, could be developed."



High-frequency detector device: Microwaves are transmitted via the co-planar wave guide towards a diamond (transparent square in the center).

Quantum optical effect

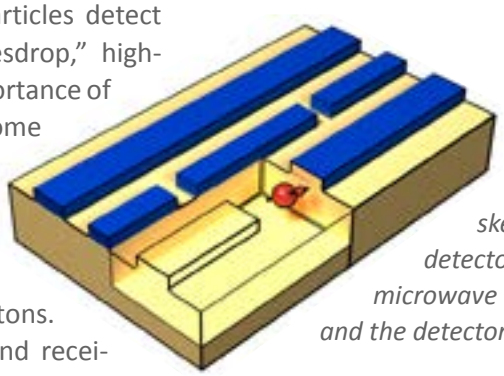
The new protocol – in a way the quantum software of such detectors – is based on the Mollow triplet, a quantum optical effect of emission lines known for almost fifty years.
"Crucially, the absorption frequency of our scheme depends only on the timing and the frequency of the quantum control we apply, so we can tune it by experimental parameters. It is independent of the detector spins' natural transition and hence stable even in a fluctuating external magnetic field," he explains the advancements and robustness of their system.

Secure data encryption

Single magnetic dopant atoms in semiconductors are promising candidates for quantum computers, quantum communication and quantum sensing.
Quantum communication approaches use single light particles (photons) to transmit encrypted messages. Efficient transmitters and detectors based on quantum devices could help to transmit single particles over long distances and, hence, open the road for quantum communications. So far, efficient detection was feasible only in the low-frequency range up to several MHz.
"Especially regarding data safety this technique provides a clear improvement compared to traditional algorithms, as quantum particles detect every attempt to eavesdrop," highlights Reinhard the importance of quantum sensors. "Some of the best quantum processors, for example those used by Google, already operate on single microwave photons. Efficient transmitters and receivers could help to broadcast these particles over long distances – a new channel of quantum communications."

Quantum microphones and the quest for life out there

"Further exciting applications using our new quantum sensors are based on the capability to detect quantum mechanic sound particles (phonons). They could therefore act as quantum microphones and quantum loud speakers," explains Reinhard.
Arguably the most exotic application for the detectors could be located in another research field. With a smile he tells: "The detection of very weak, narrow-band radio signals would be a 'litmus test' for extraterrestrial life. A big aim for quantum science." ■



Concept sketch of the detector with the microwave guide (blue) and the detector spin (red).

Publication

Quantum-sensing of weak radio-frequency signals by pulsed Mollow absorption spectroscopy
Joas T, Waeber AM, Braunbeck G, Reinhard F
Nat Commun, 2017 Oct 17;8(1):964
doi: 10.1038/s41467-017-01158-3




Children & Career - No problem at NIM! - Part 1

In our two-part series we talk with a NIM-GP PhD student and group leaders what might change after having a child - and how can NIM support you.

Group meeting as fixed date - even during the parental leave.

A matter of fairness

Tim Liedl - Group leader and father taking parental leave

For professor Tim Liedl there was no question to actively participate in raising the kids in their first year of life.

"Ideally, there should be an equal division of the parental leave between both parents," states Liedl. "In the first months, when many babies are fully breast-fed, the mother would probably take over. During the second block of parental leave the father could assume this role. The order is up to the parents of course, but the current '12+2 months' solution is mostly applied as '12+2', often with two parallel months."

"In Scandinavia, the equal division of the parental leave is far more common and it works perfectly fine!" he suggests.

The biophysicist himself recently had six months of parental leave while his wife returned to her job.

Important to him are both aspects, the contribution as father, and the fast re-entry of the mother into her job. He suggests that knowing the children are well looked after, women should consider to return to work with at least 80 % time.

"This is important especially with an eye to the future and potential career jumps. I recommend young moms to always plan with regard to the relation statistics and the divorce law, to recognize the risk of low pensions and ultimately poverty in old age for women due to care time and part-time work."

Tim Liedl himself took the chance to spend time with his toddlers, and took parental leave for both kids. "There was some organization required, but it is feasible and everyone can take the time, even as a group leader!" he stresses.

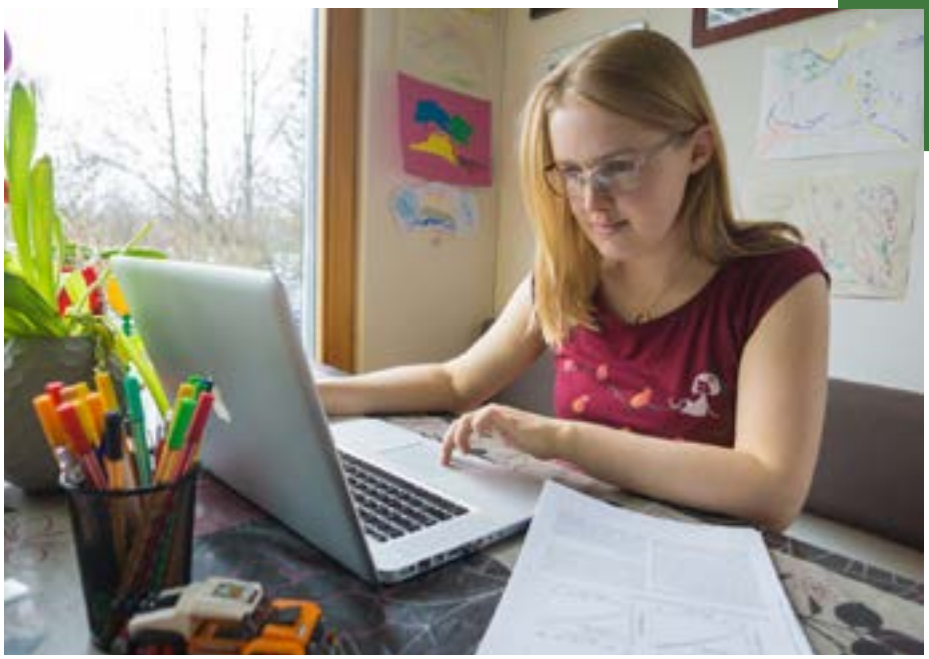
During his absences, Liedl was always available for his group, and participated in the weekly group meeting. His team performed very well and independently, he praises. When his help was needed, e.g. during the review of submitted publications, he was there to support the effort. Not surprisingly, it was unavoidable to write promised expert opinions and new research proposals. "In some cases this was quite challenging and required discipline to work in the evenings."

In his personal case, the best solution would have been the existing 'mini-job-model' with a ten hours per week contract during the parental leave, and a corresponding extension of the parental leave based on the optional part-time model.

The long-term planning of exams, defenses, expert opinions and publications is key. "But in general, there should be enough time to plan everything in advance," the scientist sums up with a smile. ■

It is worth it!

Maria Lohse - Doctoral thesis and child



The NIM Family and Women Support Program allowed Maria Lohse to juggle her dissertation and her family life.

Maria Lohse, PhD student in the group of Professor Thomas Bein, was halfway through her dissertation when she got pregnant.

As Maria wanted to avoid any risk from the chemicals she needed for her work on covalent organic frameworks (COFs), she immediately paused her practical lab work.

"A lab assistance financed by the NIM family program was a great support and could finish some experiments, though it took a while to find one," tells the PhD student, "luckily one of my colleagues took care of the technical briefing."

When Maria found a day care institution for her daughter after four months already, the NIM family program subsidized the nursery fees the young family had to pay. "We were very happy about this financial support – it is not easy to live in Munich with a child having only the income of two PhD students."

It was optimal for Maria to be back in the lab that fast and the break had no negative effect on her dissertation. Despite the pause, her supervisor Professor Bein supported her until the end of her doctoral thesis that she recently defended.

"To become a mother is no problem in academia. Quite the opposite is the case. During the doctorate is a good time as there are possibilities for financial support and one really gets skilled in time-efficient working – this provides optimal starting conditions for the future career!" argues the young mother, "and no matter how difficult the experiments may be, your child always makes your day."

Info-Box

Support possibilities of NIM and the Universities in Munich and Augsburg at a glance:

NIM: NIM Family and Women Support Program

- Funding of a laboratory assistance
- Scholarship for child care
- Travel grants to attend conferences
- Regular "Elternstammtisch" meetings

Contact: silke.mayerl@lmu.de, +49 (0) 89 – 2180 3383
www.nano-initiative-munich.de/en/gender

LMU: Having children in academia

- Family service for LMU employees
- Help with child care
- Further information

www.frauenbeauftragte.uni-muenchen.de/kindwiss

TUM: TUM.Family – Familienservice

- TUM family service (Career and family, child care, holiday child care)

www.chancengleichheit.tum.de/en/family/

University of Augsburg: Family at Uni Augsburg

- Family service with link collection

www.uni-augsburg.de/de/einrichtungen/frauenbeauftragte/Familie

Events

Vivid discussions on recent research concerning renewable and sustainable energy production during the NIM Conference in the Literaturhaus Munich.

Energy supply of tomorrow

NIM Conference "Nanostructured functional Materials for sustainable Energy Provision", July 26 – 28 2017, Literaturhaus Munich

Recent development of technologies for renewable energy provision resulted in a portfolio of devices and approaches capable to contribute to the solution of so-called "generation vs consumption" problems. The combination of those approaches should likely accelerate elaboration of more powerful and flexible energy conversion and storage schemes.

Therefore, this conference brought together leading researchers working in the field of electrocatalysis, solar cells, batteries and materials science. The conference topics spanned a wide range of problems, from fundamental understanding of functionality of materials to their implementation in energy conversion and storage devices.

The conference program with 24 speakers invited by Aliaksandr Bandarenka, Alessio Gagliardi, and Ulrich Heiz attracted more than 100 registered participants. ■

Atoms in resonance

NIM Conference on Resonator Quantum Electrodynamics, August 29th – September 1st 2017, Kardinal-Wendel-Haus Munich

The NIM professors Jonathan Finley, Rudolf Gross and Gerhard Rempe organized the second NIM Conference on Resonator Quantum Electrodynamics (RQED) at the beautiful Kardinal-Wendel-Haus in the heart of Schwabing.

Like in the previous meetings, for the 2017 conference researchers from several areas of quantum physics were invited. The unifying theme was the study of individual and artificial atoms coupled to optical or microwave resonators. Pioneers of the fields gave introductory tutorial lectures, followed by state-of-the-art research talks.

This blend was ideal for sharing the rapidly growing knowledge and establishing connections between solid-state and atomic physics.

The conference was a great success and another stepping stone for the promotion of Munich's quantum physics agenda. ■

Networking within NIM

6th Meeting of the NIM technicians, July 6th 2017 at the University of Augsburg

Technicians and engineers of all NIM areas accepted the invitation of Andreas Spörhase, technical manager at the Chair for Experimental Physics of Professor Achim Wixforth.

The underlying idea is to foster vivid communication about techniques and methods as well as technical problems that might emerge and get solved in the high tech research labs in Munich, Garching and Augsburg.

The importance of such exchange at the technician's level was highlighted in the welcome words of Alois Zimmermann, chancellor of the University of Augsburg, and in the informative talks by Dr. Peter Sonntag, Christoph Hohmann, Philipp Altpeter and Andreas Spörhase. Lab tours to a 'Biolab', an 'Optics lab' and the clean rooms complemented the meeting. ■

Improved vision

3rd International Conference on Enhanced Spectroscopies (ICES), September 4 – 7 2017, LMU Campus Großhadern

Recent developments related to the science and application of enhanced optical near-fields were presented to about 130 international participants congregated at the LMU High Tech Campus in Großhadern.

Topics ranged from tip-enhanced spectroscopy of single molecules and molecular optomechanics to SERS-based assay platforms for highly sensitive *in vitro* diagnostics. The enhanced optical near-field microscopy technique allows the imaging of structures 20 to 100 nm in size.

Besides illustrating the enormous progress achieved within the field during the last years, the ICES provided a platform for lively discussions and scientific exchange stimulating future collaborative efforts.

The conference was organized by Professor Achim Hartschuh and his group together with the Nanosystems Initiative Munich (NIM) and the Center for Nanoscience (CeNS), and financially supported by the DFG as well as by several industry sponsors and exhibitors. ■

Solar fuels

NIM scientists vividly discussed about the future of solar energy and possibile applications with international experts from science and industry at the 6th SolTech Conference in Munich.

Almost 200 participants convened in the conference room of the Haus der Bayerischen Wirtschaft in Munich on October 4 and 5, 2017.

There were several NIM members amongst other scientists of the research network “Solar Technologies Go Hybrid”, SolTech, together with international top speakers and experts from industry.

Topics of fruitful discussions were latest research results on both materials and processes to convert solar energy into electricity and chemical energy.

“The artificial photosynthesis could be applied for the production of combustible gases such as hydrogen and methane,” explains Professor Jochen Feldmann, who is member of the SolTech network. “In the future, climate-neutral and environmentally compatible synthetic fuels could replace fossil fuels.”

SolTech bundles the expertise in materials science and process engineering in so-called KeyLabs at the universities of Würzburg, Bayreuth, Erlangen and both Universities in Munich, LMU and TUM. Therefore, SolTech can position its research on the hot topic “Solar Energy Conversion” with a leading position in the international scene. ■

Web: www.soltech-go-hybrid.de

Nano cosmos for everyone

At the NIM NanoDay on Sunday, September 10th 2017, visitors could gain exciting insights into the nano cosmos.

Shortly after the opening of the NIM NanoDay, the Lichthof hall of the LMU was already bustling with visitors.

Young NIM scientists enthusiastically presented their research and the visitors could challenge themselves in many hands-on experiments. There were for example photonic crystals, which are used in the displays of electronic devices, experimental set-ups to produce graphene layers and simple solar cells to explore. VR glasses allowed a virtual lab visit. With a kicker game, cancer cells could be beaten with nano particles.

In the well-filled lecture hall, the visitors could enjoy scientific talks about nano drugs, solar cells, nano earthquakes, optical forces and diamonds as magnetic resonance tomographs – a journey through all research fields within the Nanosystems Initiative Munich (NIM).

The physics cabaret by Georg Eggers and Michael Sachs provided an exciting trip through the nano cosmos and its various aspects.

In addition, the nano quiz and the fully booked lab visits about the "origin of life" and the "magical material graphene" were a great success. ■

Shaping the future with Nano

17th Münchner Wissenschaftstage, November 25 – 28 2017, Old Congress Hall Munich

Shaping the future with Nano" was the topic of the joint booth of NIM and the Center for Nanoscience (CeNS) during the 17th Münchner Wissenschaftstage. The general subject of this year's event was "Future plans – research, society, mankind."

During all four days, the booth was well attended by interested visitors of all ages. Already the smallest could get a feeling for "nano" playing with "magical sand" and ferrofluids, or building paper viruses and DNA double helices. Grown-ups could examine a hands-on model of an atomic force microscope and photonic crystals.

Scientists working in different NIM and CeNS groups enthusiastically explained their projects and answered questions of visitors and school classes. The knowledge newly gained from the discussions and the posters could be used right away to answer our little "Nano-Quiz". "Selfies in the lab" were perfect memoirs and a kicker-tournament with nanoparticle balls against cancer cells could round up the "nano experience". ■

Current research at a historical site: Old Congress Hall Munich near the Theresienwiese

Making fuels with a new kind of plant

Ian D. Sharp – drawing inspiration from Mother Nature

Artificial photosynthesis for renewable generation of fuels from sunlight is an exciting and important research field as global carbon dioxide emissions are leading to a warming climate. Semiconductor-based systems have great potential to capture solar energy and revolutionize the production of fuels in a new, carbon-neutral cycle.

However, existing materials are not yet up to the task. Working on fundamental research to discover and develop new semiconductors and assemblies, Ian D. Sharp, Professor for Experimental Semiconductor Physics at TUM and NIM member since September 2017, aims to meet this growing demand for sustainable energy generation: “Ideal artificial photosystems need to be efficient on one hand, and durable and inexpensive on the other. Creating functional systems with all of these properties is the major challenge in the field.”

Between Berkeley and Munich

After finishing his PhD in Materials Science and Engineering, Sharp decided the time had come to move (on). “I wanted to go somewhere quite different for my PostDoc,” with a smile, he adds, “not in the States, which is the common path for most other Americans, but really somewhere far away, to gain new experiences and see how research is done elsewhere.” He started as Alexander von Humboldt Research Fellow at the Chair of Professor Stutzmann at the Walter Schottky Institute (WSI), extended his stay as Carl von Linde Junior Fellow and now returned after several years in the states.

“Munich's academic environment is a fantastic place to do research. I'm very happy again to be part of this vibrant and interdisciplinary research community with outstanding and absolutely world class expertise and capability!” describes Sharp with obvious excitement to be back at the WSI. “The great spirit and acceptance of the urgent need for renewable energy across the society back up our research.”

Improving energy sustainability

Semiconductor interfaces, and especially interface defects, were Ian Sharp's main research interest from the beginning. Early on, he realized that such defects play a critical role for the semiconductor function but are very difficult to understand and control.

Therefore, he focused in detail on the characterization of hybrid interfaces between semiconductors and covalently bound organic molecules.

It was during this time that he gained a passion for understanding and controlling photochemical reactions, when he investigated what happens upon transfer of such systems into complex aqueous environments.

A major challenge in semiconductor-based photosystems is to reliably control charge transport through the semiconductor and across real interfaces, and so to drive the desired catalytic transformations while minimizing charge recombination losses and corrosive side reactions.

“To address this, we will precisely grow semiconductors and advanced nanostructures that can be used to analyze and direct charge generation and transport, and analyze the resulting photochemical transformations on surfaces,” he says, enthusiastically summarizing his approach.

A passionate teacher

Besides the optimal scientific conditions, for Ian Sharp the second decisive factor to accept the professorship were the students. “A very rewarding aspect of returning to an academic environment is the teaching: I really enjoy giving lectures, being challenged by the students' questions, and interacting with the next generation of young scientists. I missed that as a Staff Scientist at the Lawrence Berkeley National Laboratory.”

In this spirit: a warm welcome!

Navigating through the body

Olivia Merkel – The targeted delivery of drugs

A demanding and yet exciting year lies behind Olivia Merkel: if all her air miles are added up, the scientist has circumnavigated the earth twice to manage two research groups in parallel, one in Detroit and one in Munich. And more or less in passing she also got married.

A precious souvenir

Her love for scientific research began during her years of study in Marburg when she worked as a student assistant in Pharmaceutical Technology. "A key moment was when I saw how a mere fifty picomole of a substance could have an enormous impact on cells," recalls Olivia Merkel. "And it was great doing something which paves new ways and is maybe someday put to use, such as drugs with fewer side effects."

The student assistant job was followed by one year of practical training, and her diploma and PhD theses in the same group. As PostDoc, she was involved in team coordination and teaching – tasks she enjoyed greatly.

Being an assistant professor at Wayne State University in Detroit allowed her to build her own group.

Equipped with plenty of experience and a Starting Grant of the European Research Council (ERC) worth around two million Euros, Merkel returned to Germany. In the Fall of 2016, she was appointed professor at the Chair of Pharmaceutical Technology at the LMU.

Research from A to Z

The main focus of her team is on the development of targeted delivery systems for therapeutic formulations (smart drug delivery systems), also utilizing new and better tolerable materials.

One example is the endogenous molecule oligospermine which could be used to coat nanoparticles. Its yield is currently still low, but the new nanoparticles developed by the Munich lab have already proved themselves in initial tests performed with cell cultures. The aim is to replace currently used non-biodegradable and toxic structures in nanoparticle coatings.

All their projects comprise the entire range of research, from the search for a suitable active substance, through its packaging in biocompatible nanoparticles and its transport inside the body, to its release and effect in the target tissue. "For my PhD students it is particularly motivating to explore and design all steps from materials synthesis through cell experiments to tests in animal models," says Olivia Merkel.

Treating asthma with nanoparticles

Olivia Merkel received an ERC Starting Grant for developing a new method for treating asthma. A main symptom of the disease is that so-called T cells cause an inflammation of the airways after the inhalation of allergens, for example.

Merkel and her team are trying to insert therapeutic nucleic acids (siRNA) into these cells and thus regulate their activity. If delivered via the bloodstream, the liver holds back a large part of the siRNA-filled nanoparticles, however. The pharmacists therefore experiment with particles in powder form, which can reach the pulmonary alveoli directly through the lung. "Due to a close cooperation with the Munich-based Comprehensive Pneumology Center, we can work with cell samples from patients and have access to specific animal models," reports Merkel.

Besides working on siRNA, another highly topical technology plays an important role in Merkel's research: the CRISPR-Cas method. It allows for the targeted, complete and permanent removal or replacement of individual genes. The pharmacists use CRISPR-Cas to re-sensitize chemo-resistant lung cancer cells and to fight the causes of a severe muscle disease, muscular dystrophy.

Exiting times ahead

By now, all PhD students in Detroit have been awarded their degrees and she can focus on her group in Munich. One might think that Olivia Merkel's life will now be a little quieter. But that would be boring... And so since December her little son Matteo has been ensuring that his mother maintains her multitasking abilities... ■

Hello, Goodbye

Honored

The European Research Council (ERC) awarded Alexander Högele (LMU), Gregor Koblmüller (TUM), Lode Pollet (LMU), and Frank Pollmann (TUM) each with a prestigious Consolidator Grant. Dieter Baun (LMU) obtained an Advanced Grant and Alexander Urban (LMU) a Starting Grant. The project "nanodevice" from Hendrik Dietz (TUM) will be funded with a Proof of Concept Grant.

Peter Hänggi (UA) received the Blaise Pascal Medal in Physics 2018 from the European Academy of Sciences.

Heinrich Leonhardt (LMU) has won the "m^4 Award" of the Free State of Bavaria and the "Leibniz-Gründerpreis 2018" together with colleagues from LMU and FMP Berlin for their project "Tubulis Therapeutics".

The project team "CascAID+", under the supervision of Friedrich Simmel (TUM) received the second prize at the 2017 competition of the International Genetically Engineered Machine (iGEM) Foundation. NIM had supported the team's participation financially.

Ernst Wagner (LMU) was elected as member of the European Academy of Sciences (EurASc) and affiliated into the Controlled Release Society College of Fellows.

The University of Augsburg awarded Ursula Wurstbauer (TUM) with a Guest Professorship.

Jochen Feldmann and Alexander Urban (both LMU) are participating in the Research Consortium "Exploiting the Properties of Quantum-Materials – New Routes to Innovative Optoelectronic Components (ELQ-LED)".

Bert Nickel (LMU) contributes to the project "H2O: Heterostructures of 2D Materials and Organic Semiconductor Nanolayers" within the EU funding program FLAG-ERA.

The interdisciplinary project "Solar Technologies Go Hybrid" (SolTech) initiated by the Government of Bavaria will be funded with 17 million Euros for another five years.

Farewell:

Prof. Dr. Christoph Bräuchle (Chemistry Department, LMU) went into retirement. NIM would like to thank him for his outstanding contributions to the success of the cluster and wishes him all the best.

NIM welcomes as new PIs:

PD Dr. Gregor Koblmüller
(Semiconductor Quantum Nanomaterials Group, Walter Schottky Institute / Physics Department, TUM)

Prof. Dr. Stefan Maier
(Chair of Experimental Physics - Hybrid Nanosystems, Faculty of Physics, LMU)

Prof. Dr. Frank Pollmann
(Topology and Correlations in Condensed Matter, Physics Department, TUM)

Dr. Friedemann Reinhard
(Quantum Sensing Group, Walter Schottky Institute / Physics Department, TUM)
see page 3

Prof. Dr. Ian D. Sharp
(Experimental Semiconductor Physics, Walter Schottky Institute / TUM-Physics)
see page 9

Prof. Dr. Philip Tinnefeld
(Chair of Physical Chemistry, Faculty of Chemistry and Pharmacy, LMU)

Dr. Alexander Urban
(Chair for Photonics and Optoelectronics, Faculty of Physics, LMU)

NIM welcomes as new Associated Members:

Dr. Frank Deppe (Walther Meißner Institute / TUM)
Dr. Hanna Engelke (Chemistry Department, LMU)
Dr. Michael Kaniber (Walter Schottky Institute / TUM)
Dr. Dana Medina Tautz (Chemistry Department, LMU)
Dr. Christoph Westerhausen (University of Augsburg)

Outlook

September 4 – 6, 2018
NIM Conference:
"The Future of NanoScience - 12 Years of the Nanosystems Initiative Munich Cluster"
Evangelische Akademie, Tutzing

With this conference, we would like to honor the past twelve years of NIM and explore the future of nanoscience.
Distinguished experts of all research areas and successful NIM-Alumni will talk about current topics. PhD-students of the NIM Graduate Program will present their work during a poster session. In a technology transfer session, we provide a forum for companies of the NIM Spin-Off Club. The panel discussion "Quo vadis Nanoscience" with renowned participants will be public and open for everybody interested in the field of nanoscience.

About NIM

Since its foundation in 2006, the Nanosystems Initiative Munich – NIM, for short – has established itself as a leading international nano center. The design and the control of artificial and multifunctional nanosystems are the keystones of the scientific program of the Cluster of Excellence, which brings together scientists from nanophysics, chemistry and the life sciences.

The integration of these functional nanosystems in complex and realistic surroundings is the central research aspect at NIM within its second funding phase of the Excellence Initiative. Artificial nanosystems have a wide range of existing and potential applications in areas such as information technology and biotechnology, as well as in diverse energy conversion strategies.

Picture Credits

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p. 8 - Old Congress Hall: Maren Willkomm

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