



NEWSLETTER FROM NANOSCIENCE AT LUND UNIVERSITY | JUNE 2017

Update on the Plans for the New Lund Nano Lab

For the past year, we have been actively working on the planning of our new, larger clean-room facility – the new Lund Nano Lab (LNL) – at Science Village Scandinavia (SVS). After analysis of expected local vibrations and magnetic fields, we have identified a suitable area within SVS, which is approximately 150 m from the planned tram station and close to MAX IV.

Next to LNL, but in a separate building, you will find the pilot production facility ProNano. ProNano will be independent from Lund University, but will offer many fruitful interactions. The site for the new LNL is also next to the area where we hope that several of the divisions currently contributing to NanoLund will be co-located in the future.

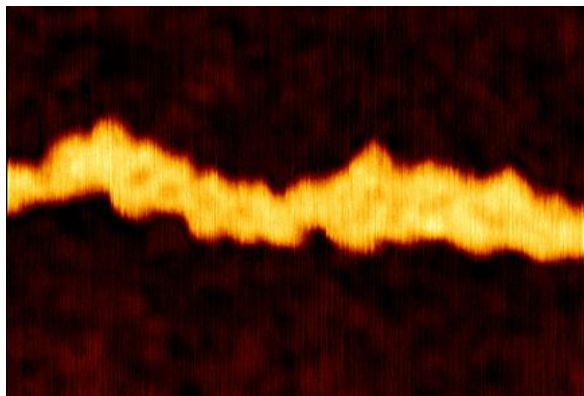
The plans for the new LNL include a detailed equipment list and layout of the cleanroom, taking into consideration factors such as efficient work flow, noise reduction and safety. Equally important are the non-visible parts such as chemical and other storage, waste handling systems, transportation of goods, service areas etc.

A very important part of the process is to make the transition to the new location as smooth as possible. We have for instance considered the transportation to and from the lab until we all move closer so there will be available work areas in the vicinity of the lab and lockers to handle personal belongings and computers. It is critical to minimize research interruptions, and we therefore aim to operate the old LNL as long as possible while ramping up operations in the new LNL. Still, there will be interruptions (probably during 2019-2020), but, we will do everything we can to keep everyone informed and to allow students and scientists to plan their research work accordingly.

Many individuals are contributing to the planning work, including LNL's reference and user groups and LNL staff. We thank everyone for their hard work and welcome all additional input.

Anneli Löfgren and Maria Huffman
leaders of the planning group

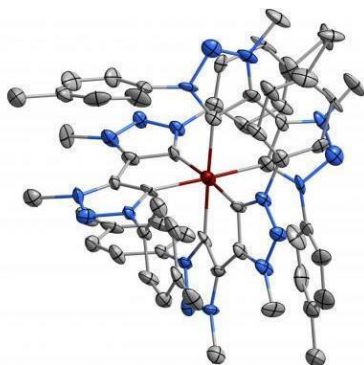




Nanotubes that build themselves

Kenneth Wärnmark has been involved in a study which have succeeded in producing nanotubes from a single building block using so-called molecular self-recognition. The tube can also change shape depending on the surrounding environment. The results can contribute to the future development of transport channels for drugs through the cell membrane.

Read the [press release](#) from Lund University or click here to find [more links](#), including the Nature Communications publication.



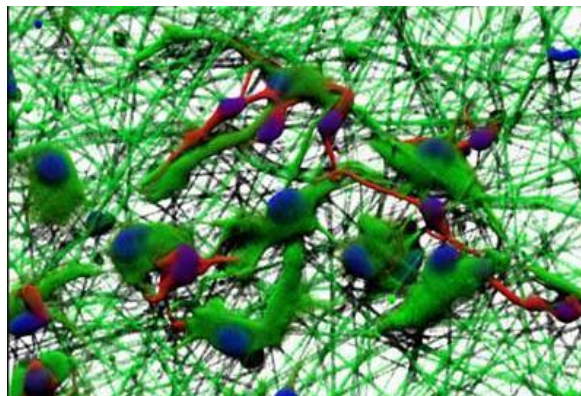
Modern alchemy creates luminescent iron molecules

Nature reports that the first iron-based molecule capable of emitting light has been made. This could contribute to the development of affordable and environmentally friendly materials for e.g. solar cells, light sources and displays. Through advanced molecular design, the NanoLund researchers have successfully manipulated the electronic properties of iron-based molecules so that they much better resemble the ruthenium-based substances.

Read the [press release](#) from Lund University or click here to find [more links](#), including the Nature publication.

Material standing on edge for efficient solar cells

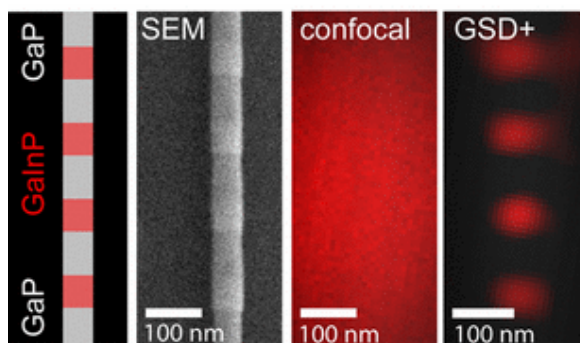
Advanced Materials reports on a new structural



Cells grow more naturally in “spaghetti”

Lund researchers involving NanoLund's Fredrik Johansson, have achieved good results with their three-dimensional fibre structures for cell culturing. If the new technique delivers what it promises, electrospinning will be able to provide new opportunities for both research and industry. With more natural cell cultures on which to conduct research, a number of biomedical research issues can be addressed in new ways.

Read the [press release](#) from Lund University or click here to find [more links](#), including links to the three publications.



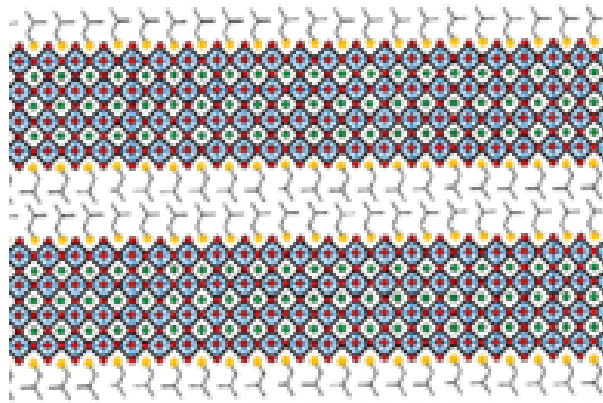
Nanowire imaging by super resolution optical microscopy

K Adolfsson, M Borgström and C Prinz from NanoLund, in collaboration with Nobel Prize winner Stefan Hell, have published that nanowires can be imaged using super resolution optical microscopy. GaInP nanowires were imaged using ground state depletion at a five fold resolution enhancement compared to confocal microscopy. This method is compatible with biological tissue imaging and is therefore promising for the investigations of cell-nanowire interactions.

The Nano Letters article has DOI: [10.1021/acs.nanolett.7b00468](https://doi.org/10.1021/acs.nanolett.7b00468)

organization using the promising solar cell material perovskite. The study shows that solar cells increase in efficiency thanks to the material's ability to self-organise by standing on edge. The current research study deals with perovskite, a new and promising material in the context of solar cells.

Read the [press release](#) from Lund University or [click here to find more links](#).



Edlund Prize to Kenneth Wärnmark

Our congratulations to Professor Kenneth Wärnmark at the Department of Chemistry, and active in NanoLund, who has been awarded the 2017 Edlund Prize from the Royal Swedish Academy of Sciences, for his cutting-edge research on iron-based dyes in solar cells.

Read more on the homepage of the Royal Swedish Academy of Sciences ([in Swedish](#)).

Tõnu Pullerits elected to the Academy

We congratulate NanoLund Member Tõnu Pullerits who was elected foreign member of the Royal Swedish Academy of Sciences' Class for chemistry. Tõnu is Professor and Head of Division at Chemical Physics.

More information on the Academy's homepage in [Swedish](#) and [English](#).



Students competing in Ericsson Innovation Award 2017

Rapidus reports that a student team from the Engineering Nanoscience programme qualified for the semifinals of the Ericsson Innovation Award 2017 in competition with 900 other teams entering the competition from around the world. The student team competes with an idea to automatically lower the price of food as the expiration date comes closer. The date is stored in the bar code on the packaging, and the lower price can be read using an app or a scanner in the store.

Opportunities for nanoscience using neutron sources

In our educational seminar series Nanoscience for Dummies, an introductory lecture on opportunities for using neutrons for nanoscience, given by Peter Schurtenberger on May 17, attracted much interest. One of the outcomes were plans for initial experiments taking advantage of the highly controlled nanostructures that NanoLund can provide.



SwedNESS kick-off

The graduate school for neutron scattering (SwedNESS) kicked off at an event in Uppsala on May 16. Financed by SSF, SwedNESS' goal is to educate 25 doctoral students as a base for



Sweden's expertise in neutron scattering with respect to the ESS. Two of the first students have started at Lund University, including a project led by Tommy Nylander that has been ramped up by NanoLund funding.

NanoLund Junior Scientist Ideas Awards 2017

NanoLund seed projects give junior scientists (PhD student and postdocs) the opportunity to propose and carry out new projects that are complementary to existing research directions in NanoLund. In the 2017 project call, ten projects were received and evaluated by a group of senior scientists and PhD students, with an emphasis on originality, feasibility and potential impact. Four projects were selected for funding by a one-time sum of 100000 SEK for research expenses:

- *Atomic ordering in group III-V ternary semiconductor nanowires*, by Hanna Kindlund, Postdoc at Solid State Physics
- *Three dimensional imaging of proteins on nanowires* by Stefán Bragi Gunnarsson, PhD student at Biochemistry and Structural Biology
- *Nanowire-gas interaction: from surface site probes to sensors* by Daniel Finkelstein-Shapiro, Postdoc at Chemical Physics
- *Nanowires for efficient terahertz emission* by Pierre-Adrien Mante, Postdoc at Chemical Physics

The projects will be presented in the form of a NanoLund Junior Scientist Ideas Award at our annual meeting on September 7.

Strengthening NanoLund's core values

Our work to further develop and strengthen the culture we would like to have for NanoLund is nearing the end of its first phase. Starting with a voting process last autumn (with up to more than 90 responses per week), we chose three core values early this year. In discussion meetings led by NanoLund's coordinators across all areas of NanoLund, we spent the spring fleshing out exactly what these values mean to us. Members of the NanoLund environment contributed more than 100 suggestions for how each of us can help strengthen these values. The result is a condensed description of how we jointly see the culture we would like to have, which we will launch at the Annual Meeting on September 7. Thank you all for your all-important engagement!

NanoLund staff scientist: Estephania Lira

At NanoLund we aim to have the highest levels of sophistication in the use of equipment and in experimental and theoretical methods. To achieve this it is crucial to have excellent senior-level technical staff who have a high level of skill, who work hands-on with PhD students and postdocs, and who help develop new methods and transfer expertise. The division of Synchrotron Radiation Research (SLF) operates as many as seven scanning probe microscopes that are heavily used for research projects within NanoLund. With the increasing size and complexity of the STM/AFM facility, Dr. Estephania Lira was hired 2014 as research engineer for maintaining the STM and AFM equipment. Since then she has extended the range of STM and AFM capabilities, and she has trained new M.Sc. and Ph.D. students in handling the microscopes. The presence of a research engineer also allows us to take on more projects with external companies. Estephania can help you getting started on STM/AFM, identifying if we have the right instrument and getting you in contact with other relevant experts at SLF if you need a more in-depth collaboration for your samples. To contact Estephania, send her an e-mail at: estephania.lira@sljus.lu.se





Nanowire Week in Lund

Nanowire Week is the merger of two well-established and highly successful annual workshops: NANOWIRES and the Nanowire Growth Workshop. It took place in Lund May 29-June 2, 2017 and was chaired by Kimberly Thelander. Nanowire Week covered all topics of nanowire-related research, from fabrication and fundamental properties to applications. With 340 participants it is the largest workshop entirely dedicated to this research field.

Fjärde Uppgiften recently released an interview with Lars Samuelson on the beginning of a Swedish nanotechnology industry. The duration of [the interview](#) (in Swedish) is about 12 minutes.

On the homepage you may also find older interviews with [Lars Montelius](#) (on lighting) and [Heiner Linke](#) (on how nanotechnology will change the world).



Coming up

NanoLund Annual meeting Sept 7, 2017

Save the date for the NanoLund annual meeting which will take place September 7 in Lund. Our Scientific Advisory Board will visit, and we plan for a day of scientific talks and posters on the theme "Why we do Nanoscience: from Fundamental Curiosity to Society's Grand Challenges".

More information and signup on the [NanoLund homepage](#)

LAPASO workshop 5-6 September, 2017

Welcome to the European Workshop on Label Free Particle Sorting! The workshop aim to connect experience in microfluidic label-free particle fractionation based on the inherent properties and put it to use to address important biomedical problems.

[Join or read more here.](#)

Bio4COMP workshop 12-13 September, 2017

Dresden, Germany will host the workshop "New Directions of Biocomputation" chaired by Heiner Linke. Veterans of quantum- and DNA computing will come together with experts in molecular motor-powered, network-based computing to develop new directions of biocomputation.

[Read more here.](#)

NanoLund After work August 24 at 16:30

Thursday August 24 you are invited to join for a NanoLund After Work at Gloria's Restaurant and Sportsbar, Sankt Petri Kyrkogata 9, downtown Lund. We will be in a room upstairs and hope to see many of you there for catching up and chatting to old and new colleagues. Welcome!



Introduction event for new NanoLund staff

Are you new in the NanoLund environment? Welcome to an introductory event in the afternoon of **August 24, 2017**. We inform about what NanoLund is, how we work together and what opportunities are open to you, followed by an after work for everyone downtown Lund. To sign up (or to let us know about new people who should be invited) please contact Line.Lundfald@ff.lth.se.

Selection of articles with NanoLund affiliation since Dec2016

Crystal Structure Induced Preferential Surface Alloying of Sb on Wurtzite/Zinc Blende GaAs Nanowires
M Hjort, P Kratzer, S Lehmann, SJ Patel, KA Dick, CJ Palmstrom, R Timm, A Mikkelsen
Nano Lett., 2017, (Web): May 24 DOI: [10.1021/acs.nanolett.7b00806](https://doi.org/10.1021/acs.nanolett.7b00806)

Elimination of Lateral Resistance and Current Crowding in Large-Area LEDs by Composition Grading and Diffusion-Driven Charge Transport

P Kivisaari, I Kim, S Suihkonen, J Oksanen
Adv. Electron. Mater. 2017, 1700103 DOI: [10.1002/aelm.201700103](https://doi.org/10.1002/aelm.201700103)

Absorption and transmission of light in III–V nanowire arrays for tandem solar cell applications

N Anttu, V Dagtý, X Zeng, G Otnes, M Borgström
Nanotechnology, 28 (2017) 205203 (6pp) DOI: [10.1088/1361-6528/aa6aee](https://doi.org/10.1088/1361-6528/aa6aee)

The nanoparticle protein corona formed in human blood or human blood fractions

M Lundqvist, C Augustsson, M Lilja, K Lundqvist, B Dahlbäck, S Linse, T Cedervall
PLoS ONE, 12(4): e0175871 DOI: [10.1371/journal.pone.0175871](https://doi.org/10.1371/journal.pone.0175871)

Electronic structure and excited state properties of iron carbene photosensitizers – A combined X-ray absorption and quantum chemical investigation

F Ericson, A Honarfar, O Prakash, H Tatsuno, LA Fredin, K Handrup, P Chabera, O Gordivska, KS Kjær, Y Liud, J Schnadt, K Wärnmark, V Sundström, P Persson, J Uhlig
Chem. Phys. Lett. (2017) (in press) DOI: [10.1016/j.cplett.2017.03.085](https://doi.org/10.1016/j.cplett.2017.03.085)

Deposition efficiency of inhaled particles (15–5000 nm) related to breathing pattern and lung function: an experimental study in healthy children and adults

J Rissler, A Gudmundsson, H Nicklasson, E Swietlicki, P Wollmer, J Löndahl
Particle and Fibre Toxicology, 2017 14:10 DOI: [10.1186/s12989-017-0190-8](https://doi.org/10.1186/s12989-017-0190-8)

Roadmap and roadblocks for the band gap tunability of metal halide perovskites

EL. Unger, L Kegelmann, K Suchan, D Sörell, L Korte, S Albrecht
J. Mater. Chem. A, 2017 DOI: [10.1039/C7TA00404D](https://doi.org/10.1039/C7TA00404D)

Phase diagrams for understanding gold-seeded growth of GaAs and InAs nanowires

M Ghasemi and J Johansson
J. Phys. D: Appl. Phys. 50 (2017) 134002 DOI: [10.1088/1361-6463/aa601c](https://doi.org/10.1088/1361-6463/aa601c)

Radial tunnel diodes based on InP/InGaAs core-shell nanowires

O Tizno, B Ganjipour, M Heurlin, C Thelander, MT Borgström, L Samuelson
Appl. Phys. Lett. 110, 113501 (2017) DOI: [10.1063/1.4978271](https://doi.org/10.1063/1.4978271)

Real-time in situ analysis of biocorona formation and evolution on silica nanoparticles in defined and complex biological environments

R Frost, C Langhammer, T Cedervall
Nanoscale, 2017, 9, 3620–3628 DOI: [10.1039/C6NR06399C](https://doi.org/10.1039/C6NR06399C)

Time-resolved terahertz spectroscopy reveals the influence of charged sensitizing quantum dots on the electron dynamics in ZnO

S Bamini N, H Němec, K Židek, M Abdellah, MJ Al-Marri, P Chábera, C Ponseca, K Zheng, T Pullerits
Phys. Chem. Chem. Phys., 2017, 19, 6006–6012 DOI: [10.1039/C6CP07509F](https://doi.org/10.1039/C6CP07509F)

Electron–acoustic phonon coupling in single crystal CH₃NH₃PbI₃ perovskites revealed by coherent acoustic phonons

P-A Mante, CC Stoumpos, MG Kanatzidis, A Yartsev
Nature Communications, 8:14398 DOI: [10.1038/ncomms14398](https://doi.org/10.1038/ncomms14398)

In_xGa_{1-x}P Nanowire Growth Dynamics Strongly Affected by Doping Using Diethylzinc

G Otnes, M Heurlin, X Zeng, MT Borgström
Nano Lett., 2017, 17 (2), pp 702–707 DOI: [10.1021/acs.nanolett.6b03795](https://doi.org/10.1021/acs.nanolett.6b03795)

Majorana bound state in a coupled quantum-dot hybrid-nanowire system

MT Deng, S Vaitiekėnas, EB Hansen, J Danon, M Leijnse, K Flensberg, J Nygård, P Krogstrup, CM Marcus
Science, 23 Dec 2016 DOI: [10.1126/science.aaf3961](https://doi.org/10.1126/science.aaf3961)

Conduction Band Offset and Polarization Effects in InAs Nanowire Polytype Junctions

I-J Chen, S Lehmann, M Nilsson, P Kivisaari, H Linke, KA Dick, C Thelander
Nano Lett., 2017, 17, 902–908 DOI: [10.1021/acs.nanolett.6b04211](https://doi.org/10.1021/acs.nanolett.6b04211)



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