

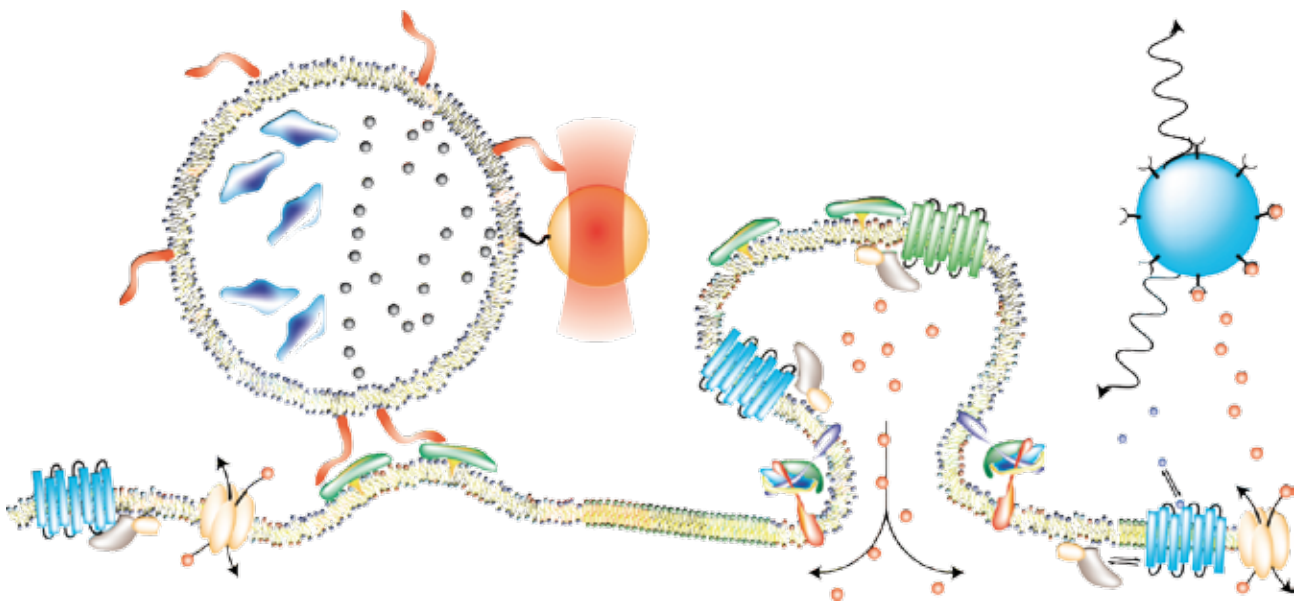


# Lundbeck Foundation Center for BioMembranes in NanoMedicine

## FIRST YEAR REPORT

# Lundbeck Foundation Center for BioMembranes in Nanomedicine

## First Year Report



Center Directors: Ulrik Gether<sup>1</sup> M.D., D.M.Sc., Professor of Molecular Neuropharmacology and Dimitrios Stamou<sup>1,2</sup> Ph.D., Professor, Head of the Bio-Nanotechnology and Nanomedicine Laboratory

Affiliations: <sup>1</sup>Department of Neuroscience and Pharmacology, <sup>2</sup>Faculty of Health Sciences, University of Copenhagen and the Nano-Science Center, University of Copenhagen

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## I. INTRODUCTION

The Lundbeck Foundation Center for Biomembranes in Nanomedicine (CBN) was established in 2010 and has now been operating for one and a half years. The mission of CBN is to employ novel nanoscale technologies down to the single molecule level in order to investigate critical protein-membrane and membrane-membrane interactions controlling signal transmission across biological membranes. The research focus of the Center spans from neuronal to prokaryotic cell-to-cell signaling, and the systems studied include G protein coupled receptors, ion-coupled neurotransmitter transporters as well as vesicle exocytosis and endocytosis. It is also the goal of CBN to develop ultrasensitive assays for detection of individual molecules of receptors and transporters in the cell membrane as well as novel nanobiosensors for dopamine and related transmitters. The insight from the center research will form the basis for subsequent development of prototypical nano-biosensors and design of membrane nano-containers for drug delivery. We have strong expectations that the research of the center will provide multiple new insights that will lead to improved prevention, diagnostics and treatment of brain disorders and infectious diseases, and thus be of direct benefit to patients.

The center is highly interdisciplinary and brings together a large team of experts in biophysics, biochemistry, bioorganic chemistry, molecular and cellular biology. This first-year report describes the activities of the center from the start, March 1st 2010, until September 2011.

During the first year of CBN, organizational, administrative and scientific infrastructure has been consolidated, and 12 people have been hired and integrated in collaborative projects. The Center has published 22 peer-reviewed scientific papers and many additional papers are submitted or in preparation. Importantly, several of the publications have been accepted in high-impact journals including *Science*, *Nature Nanotechnology* and *Proceedings of the National Academy of Sciences of the United States*. Furthermore, CBN researchers and CBN affiliated staff have received approximately 15 million Danish kroner of cofinancing for their research.

On behalf of CBN Steering Committee

Dimitrios Stamou  
Center Director

Ulrik Gether  
Center Director

## 2.THE CBN CENTER – OUR FIRST YEAR

### Organization

The Lundbeck Foundation Center for Biomembranes in Nanomedicine is based on interdisciplinary collaboration between ten research groups at the University of Copenhagen.

### The 10 participating research groups:

Prof. Gether	Molecular Neuropharmacology Group	Department of Neuroscience and Pharmacology	Faculty of Health Science
Prof. Givskov	Center for Antimicrobial Research	Department of International Health, Immunology and Microbiology	Faculty of Health Science
Prof. Jensen	Nanobioorganic Chemistry Group	Department of Basic Sciences and Environment	Faculty of Life Science
Prof. Loft	Nanotoxicology Group	Department of Public Health	Faculty of Health Science
Assoc. Prof. Martinez	Biosensor Group	Department of Neuroscience and Pharmacology and The Nano Science Center	Faculty of Health Science
Prof. Mortensen	Scattering Biophysics Group	Department of Basic Sciences and Environment	Faculty of Life Science
Prof. Oddershede	Optical Tweezers Group	Niels Bohr Institute	Faculty of Natural Science
Prof. Stamou	Bionanotechnology and Nanomedicine Group	Department of Neuroscience and Pharmacology and The Nano Science Center	Faculty of Health Science
Prof. Sørensen	Neurosecretion Group	Department of Neuroscience and Pharmacology	Faculty of Health Science

The Directors of the Center are Professor Ulrik Gether and Professor Dimitrios Stamou. The CBN center is jointly led by the two Directors and based in Department of Neuroscience and Pharmacology, Faculty of Health Sciences, University of Copenhagen. In addition to the two Directors, the Steering group includes Professor Michael Givskov, Associate Professor Karen Martinez and Professor Jacob Balslev Sørensen.

During the first year the Directors and the Steering Committee of CBN have focused on establishing the organization and the science strategy. In the coming year, we will consolidate further the existing interactions among the research groups and support new interdisciplinary initiatives.



The center research objectives of CBN are organized in four tightly integrated work packages, these are:

- WP1-Nanoscale protein-membrane interactions.
- WP2-Nanoscale intermembrane interactions.
- WP3-Nano-biosensors.
- WP4-Drug delivery & Nanotoxicology.

The Work Packages constitute an important framework for the extensive, interdisciplinary efforts that take place among the research groups within CBN.

### **Staff and Recruitment**

In 2010, the Center recruited the first PhD students, postdoctoral fellows and supporting staff. By the end of August 2011, this included 7 PhD, 5 postdoctoral fellows and a Center Coordinator (Tinne Midtgaard). In addition, a large number of researchers have been affiliated with the Center (see below). During next year, we expect to recruit additional PhD students and postdoctoral fellows.

### **Training and Education**

An important mission of our center is to ensure optimal training of the recruited and affiliated young scientists. In addition to the daily supervision of PhD students and Master's students, the Principal Investigators of the Center have been involved in or are responsible for five different PhD courses and a summer school, all held at the University of Copenhagen. Moreover, to improve education of the young scientists within the Center, the participating research groups have organized several seminars with high profiled scientists that work on topics relevant to CBN. It is our intention to continue our focus on educational aspects in the coming years. One specific initiative which we wish to realize in 2012, is the establishment and support of a 'young scientist club' for PhD students and postdocs in the Center.

### **Events and Collaboration**

#### **Meeting with External Scientific Advisory board member:**

In January 2011 Prof. Jay T. Groves from University of California Berkeley visited Center Director Dimitrios Stamou to discuss scientific strategy and organization of the CBN.

**Seminars:** During the first year several seminars and a minisymposium were offered to the Center members and other interested researchers. These seminars are a focal point in CBN to exchange knowledge and promote understanding between CBN research groups.

#### **Minisymposium and Seminars offered by CBN:**

1. CBN MINISYMPOSIUM: PDZ domain proteins: New physiological functions and possible role as drug targets, June 10/2011 Speakers: Jun Xia, Hong Kong University of Science and Technology; Birgitte Holst, University of Copenhagen; Kenneth Lindegaard Madsen, University of Copenhagen; Kristian Strmgaard, University of Copenhagen; Kumlesh K. Dev, Molecular Neuropharmacology, Trinity College Dublin.

2. Seminar presentation by Roel F.P. Schinc, Dusseldorf University, June 7/2011: Inflammatory and DNA damaging effects of particles and Nick L. Mills, Edinburgh University: Cardiovascular effects of combustion derived nanoparticles: lessons for nanomedicine
3. Seminar presentation by Professor Manual Palacin, Institute for Research in Biomedicine, University of Barcelona, May 12/2011: Molecular basis of substrate-induced permeation by an amino acid antiporter: Transport and Symmetry
4. Guest Talk by Professor Atul Parikh, UC Davis, May 19/2011: Materials science of biological and biomimetic membranes
5. Seminar presentation by Professor Jay Groves, UC Berkeley, January 28/2011: Spatial Mutations in juxtacrine signaling

**First year annual meeting:** CBN held its first two-day overnight annual meeting at Toruplund conference Center with all CBN members and staff in March 17th to 18th. The meeting focused on presenting the organization and the research strategy of CBN. It also offered the research groups of CBN a possibility to meet and present their research. The focus of the meeting was also to provide a forum for inspiration for discussion of all scientific projects and the general plan for CBN in the coming years, as well as to serve as a platform for increasing the opportunities for further cross-disciplinary collaborations.

**Awards:** Dimitrios Stamou was awarded the annual Biotechnology Award for Young Researchers by The Danish Society for Biochemistry and Molecular Biology and Danish Society for Biotechnology.



Center director Dimitrios Stamou at the CBN Center first year meeting March 2011



## COMMUNICATIONS, publication and outreach

### Publication:

Since the start of the Center, the participating scientists have published 56 peer-reviewed papers in reputed scientific journals, 2 of which are currently in press (see page 21). Importantly, these include several publications in high impact journals such as *Science*, *Nature Nanotechnology*, *Physical Review Letters* and *Proceedings of the National Academy of Sciences of the United States*.

**Outreach:** CBN has a clear strategy for dissemination of its achievements to the general public which includes: Press releases, press articles, press interviews, popular science articles that announce new interesting findings, and a regularly updated website.

### Press releases:

1. Nanotech makes medicine greener, 04/11/2011, Press release in conjunction with the publication of paper Christensen et al, 2011 in *Nature Nanotechnology*
2. New insight into DNA under the influence of strong forces, 24/05/2011, Press release in conjunction with the publication of paper Gross et al, 2011 in *Nature Physics*
3. Controlled heating of gold nanoparticles 17/01/2011, Press releases in conjunction of paper Kyrsting et al, 2011 in *Nanoletters*
4. Hjernecellers kommunikation: Derfor går det lyn hurtigt, 16/09/2010, Press release in conjunction with the publication of paper Mohrman et al., 2010 in *Science*

### Popular articles:

1. Editor's choice: Three's the charm. Stella M. Hurtley. *Sci. Signal.*, 26 October 2010. Vol. 3, Issue 145, p. ec333 doi:10.1126/scisignal.314ec333
2. *Swiss Neutron News*, 2010: 388, 4-13. "Neutron for fuel cells". Sandor Balog, Urs Gasser, Pierre Boillat, Pierr Oberholzer, Günther G. Scherer, Eberhard Lerhman and Kell Mortensen
3. Inside materials – seeing with the neutron eyes, *ESS*, 15, 2010, (Ed. Axel Steuer and Nina Hall. Desing & print: h2o Brand Vision Limited). "Fantastic plastic. Kell Mortensen"

**Website:** A CBN website has been established. The site provides general information about CBN organization, research, staff and collaborators. It also announces events such as seminars, activities and news of relevance for the Center. During the next year the webpage will be developed further.

The webpage can be accessed through [www.nanomedicine.ku.dk](http://www.nanomedicine.ku.dk)

### 3. BOARDS

The Center is thankful to all members of the Scientific Advisory Board for their valuable feedback to the Management Team and the Steering Committee on strategic, scientific and administrative matters. This year we welcome Prof. Michael Freissmuth as our 4th member at the Scientific Advisory board. We look forward to our collaboration in the coming years.

The Steering Committee had 5 meetings during 2010-2011 to discuss and decide on general, management and strategic issues.

The Management Board takes care of the daily management and administration of the center including coordination of research projects, budget, organization of meetings and communication. The Management Board had 7 meetings during 2010-2011.

#### External Scientific Advisory Board

**Dr. Claus Bræstrup**, Former CEO of H. Lundbeck A/S, (DK)

**Prof. Jay T. Groves**, Department of Chemistry, University of California Berkeley, (US)

**Prof. Michael Freissmuth**, Department of Pharmacology, Medical University of Vienna, (Austria)

**Prof. Brian Kobilka**, MD, Department of Molecular and Cellular Physiology, Stanford University, (US)

#### Internal Scientific Advisory Board

**Prof. Thomas Bjørnholm**, Prorector, Professor, University of Copenhagen, (DK), (Chair)

**Prof. Ulla Wewer**, Dean of the Faculty of Health Sciences, University of Copenhagen, (DK), (Vice chair)

**Prof. Ulrik Gether**, Department of Neuroscience and Pharmacology, University of Copenhagen, (DK) (Scientific Director)

**Prof. Dimitrios Stamou**, Department of Neuroscience and Pharmacology and The Nano-Science Center, University of Copenhagen, (DK) (Scientific Director)

**Prof. Knud J. Jensen**, Department of Basic Sciences and Environment, University of Copenhagen, (DK), (Educational Director)

**Prof. Albert Gjedde**, Head of Department of Neuroscience and Pharmacology, University of Copenhagen (DK) (Member)

#### Steering Committee

**Prof. Ulrik Gether**, Department of Neuroscience and Pharmacology, University of Copenhagen, (DK) (Center Director)

**Prof. Dimitrios Stamou**, Department of Neuroscience and Pharmacology and The Nano-Science Center, University of Copenhagen, (DK) (Center Director)

**Prof. Michael Givskov**, Department of International Health, Immunology and Microbiology, University of Copenhagen, (DK) (Member)

**Associate Prof. Karen Martinez**, Department of Neuroscience and Pharmacology and The Nano-Science Center, University of Copenhagen, (DK) (Member)

**Prof. Jacob Balslev Sørensen**, Department of Neuroscience and Pharmacology, University of Copenhagen, (DK) (Member)

#### Management Board

**Prof. Ulrik Gether**, Department of Neuroscience and Pharmacology, University of Copenhagen, (DK) (Center Director)



**Prof. Dimitrios Stamou**, Department of Neuroscience and Pharmacology and The Nano-Science Center, University of Copenhagen, (DK) (Center Director)

**Tinne Midtgaard**, Department of Neuroscience and Pharmacology, University of Copenhagen, (DK) (Center Coordinator)



CBN Center staff from first year meeting held at Toruplund Conference Center March 2011

## 4. EMPLOYED AND AFFILIATED STAFF

Employed (22) and affiliated (55) staff as of 09/12/2011.

### Bionanotechnology and Nano-medicine Group

**Dimitrios Stamou**  
Professor and CBN Director

Nikos Hatzakis  
Assistant Professor

Vadym Tkach  
Postdoc

Kadla Røskva Rosholm  
PhD Student

Aparajita Singha  
PhD Student

### Affiliated staff

Nicky Erhlich  
Postdoc

Sune K. Jørgensen  
PhD Student

Jannik Larsen  
PhD Student

Andreas Lauge  
PhD Student

Christina Lohr  
PhD Student

Signe Mathiasen  
PhD Student

Asger Tønnesen  
PhD Student

Achebe Niels Olesen Nzulumike  
Research Assistant

Salome Veshaguri  
Research Assistant

Ian Allen  
MSc Student

Søren Andersen  
MSc Student

Christian Veje Lundsgaard  
MSc Student

Emil Pedersen  
MSc Student

Marijonas Tutkus  
MSc Student

### Biosensor Group

**Karen L. Martinez**  
Associate Professor

Agnieszka Golab  
PhD Student

Randi West Hansen  
PhD Student

### Affiliated staff

Thor C. Møller  
PhD Student

Volker Wirth  
PhD Student

Grégory Hansen  
MSc Student

Sanjin Kulenovic  
MSc Student

Nina I. Roberts  
MSc Student

### Center for Antimicrobial Research

**Michael Givskov**  
Professor

Rebecca Munk Vejborg  
Postdoc

### Molecular Neuropharmacology group

**Ulrik Gether**  
Professor and CBN Center Director

Jacob Eriksen  
Postdoc

Rasmus Herlo Beenfelt G. Jensen  
Research Assistant

### Affiliated staff

Kenneth L. Madsen  
Postdoc

Thor S. Thorsen  
Postdoc

Christian Billesbølle  
PhD Student

Troels Rahbeck-Clemmensen  
PhD Student

Ina Ammedrup Johnsen  
PhD Student

Dinna Barthold-Krüger  
PhD Student

### Neurosecretion Group

**Jakob B. Sørensen**  
Professor

Yasuko Antoku  
Postdoc

Anders Sonne Munch  
PhD Student

### Affiliated staff

Keimpe Douwe Boue Wierda  
Postdoc

Paulo César Da Silva Pinheiro  
Postdoc

Alexander Matthias Walter  
Postdoc

Trine Lisberg Toft  
PhD Student

Sofie Margrethe Bohr Fabricius  
MSc Student



### Nanobiorganic Chemistry group

**Knud J. Jensen**  
Professor

Søren L. Pedersen  
Postdoc

#### Affiliated staff

Pernille Tofeng Shelton  
Postdoc

### Nanotoxicology Group

**Steffen Loft**  
Professor

Henrik Klingberg  
PhD Student

#### Affiliated staff

Peter Møller  
Associate Professor

Pernille M. Danielsen  
Postdoc

Martin Roursgaard  
Postdoc

Janne K. Folkmann  
PhD Student

Lise K. Vesterdal  
PhD Student

Cao Yi  
PhD Student

Kim Jantzen  
MSc Student

### Scattering Biophysics Group

**Kell Mortensen**  
Professor

#### Affiliated staff

Lise Arleth  
Professor

Jacob J. K. Kirkensgaard  
Postdoc

Rasmus Høiberg-Nielsen  
Postdoc

Jens Bæk Simonsen  
Postdoc

Nicholas Skar-Gislinge  
PhD Student

Søren Kynde  
PhD Student

Selma Maric  
PhD Student

Søren Roi Midtgaard  
PhD Student

Jesper Nygaard  
PhD Student

Martin Cramer Pedersen  
PhD Student

Anna Pia Jacobsen Huda  
MSc Student

### Optical Tweezers Group

**Lene Oddershede**  
Associate Professor

Natascha Witte  
PhD Student

#### Affiliated staff

Poul Marin Bendix  
Assistant Professor

Haiyan Ma  
PhD Student

Ninna Struck Rossen  
PhD Student

Thomas Andersen  
MS Student

Anders Kyrsting  
MSc Student

## 5. CBN ASSOCIATED COLLABORATORS

Jean-Louis Ban re  
Doctor  
University, Montpellier1, France

Niels Brose  
Professor  
Max Planck Institute,  
G ttingen, Germany

Kishan Dholakia  
Professor  
St. Andrews University, Scotland,  
UK

Ken Donaldson  
Professor  
Edinburgh University, Scotland,  
UK

Leo Eberl  
Professor  
University of Z rich, Switzerland

Dirk Fasshauer  
Associate Professor  
University of Lausanne, Switzer-  
land

Prof. Michael Freissmuth  
Medical University of Vienna,  
Austria

Aurelio Galli  
Associate Professor  
Vanderbilt University, US

Sam Gellman  
Professor  
University of Michigan, US

Jay T. Groves  
Professor  
HHMI Investigator  
UC Berkely CA, US

Stenn Laugesen Hansen  
Associate Professor  
University of Copenhagen, Den-  
mark

Volker Hauke  
Professor  
Freie Universit t, Berlin, Germany

Per Hedegaard  
Professor  
Niels Bohr Institute  
University of Copenhagen, Den-  
mark

Peter Hoet  
Professor  
Leuven University, Belgium

Richard Huganir  
Professor  
John Hopkins University, US

Stephen Hyde  
Professor  
Australia`s National University,  
Australia

Jonathan Javitch  
Professor  
Colombia University NY, US

Jes C. Knudsen  
Associate Professor  
University of Copenhagen, Den-  
mark

Brian Kobilka  
Professor  
Stanford University CA, US

John Kuryian  
Professor  
HHMI investigator  
UC Berkeley CA, US

Manfred Lindau  
Professor  
Cornell University NY, US

Ralf Metzler  
Professor  
Technical University Munich,  
Germany

Erwin Neher  
Professor  
Max Planck Institute  
G ttingen, Germany

Tim Tolker-Nielsen  
Associate Professor  
University of Copenhagen, Den-  
mark

Ulf Olsson  
Professor  
University of Lund, Sweden

Jan Skov Pedersen  
Professor  
University of Aarhus, Denmark

Jean-LUC Popot  
Doctor  
IBPC, CNRS, France

S. Nader S. Reihani  
Professor  
IASBS Zanjan, Iran

Lei Shi  
Assistant Professor  
Cornel University NY, US

Harald Sitte  
Professor,  
Medical University of Vienna,  
Austria

Stephen G. Sligar  
Professor  
University of Illinois, US

Roger Sunahara  
Professor  
University of Michigan, US

Thomas C. S dhof  
Professor  
Stanford University, CA, US

Matthijs Verhage  
Professor  
Vrije University Amsterdam, The  
Netherlands

Horst Vogel  
Professor  
EPFL, Switzerland

Niels Vrang,  
Adjunct Professor  
Gubra Aps, Denmark

Renaud Wagner  
Doctor  
Universit  De Strassbourg, CNRS  
France



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Harel Winstein  
Professor  
Cornel University NY, US

Oliver Zerbe,  
Professor  
University of Zürich, Switzerland

Gijs Wuite  
Professor  
Vrije Unversiteit Amsterdam, The  
Netherlands

Lars Holm Øgental  
Associate Professor  
University of Copenhagen, Den-  
mark

## 6. COFINANCING

During the first year CBN researchers and CBN affiliated staff have received 14.667.487 DKK of cofinancing for their research. In line with strategy of CBN to strengthen education this includes nine competitive PhD scholarships awarded from the faculty of Health Sciences and the faculty of Life Sciences.

### **The following CBN researchers and CBN affiliated researchers received cofinancing for their research:**

PhD student Christina Lohr was awarded 750.000 DKK as PhD scholarship by UNIK and Faculty of Health Sciences, University of Copenhagen.

PhD student Jannik Larsen was awarded 750.000 DKK as PhD scholarship by Faculty of Health Sciences, University of Copenhagen.

PhD Student Kadla Roskva Rosholm was awarded 750.000 DKK as PhD scholarship by Faculty of Health Sciences', University of Copenhagen.

PhD student Trine Lisberg Toft was awarded 750.000 DKK as PhD scholarship by Faculty of Health Sciences, University of Copenhagen.

PhD student Troels Rahbeck-Clemmensen was awarded 1.500.000 DKK as PhD scholarship by Faculty of Health Sciences, University of Copenhagen.

PhD student Christian Billesbølle was awarded 1,500,000 DKK as PhD scholarship by Faculty of Health Sciences, University of Copenhagen.

PhD student Henrik Klingberg was awarded 750.000 DKK as PhD scholarship by Faculty of Health Sciences, University of Copenhagen.

PhD student Martin Cramer Pedersen was awarded 1.500.000 DKK as PhD scholarship by McXtrade and Faculty of Life Sciences, University of Copenhagen.

PhD student Selma Maric PhD was awarded 1.500.000 DKK as PhD scholarship by ESS, UNIK and Faculty of Life Sciences, University of Copenhagen.

Postdoc Poul Martin Bendix was awarded 400.000 DKK for an Instruments Grant by Carlsberg Foundation.

Postdoc Kenneth Madsen was awarded 150.000 DKK by International Grant For Young Scientists.

Postdoc Jacob Kirkensgaard was awarded 500.000 DKK for his Postdoc project by The Lundbeck Foundation.

Postdoc Nicky Erhlich was awarded 125.000 DKK for his Postdoc project by globalization funds.

Postdoc Jens Bæk Simonsen was awarded 500.000 DKK for his Postdoc project by Villum Kann Rasmussen Foundation.

Professor Kell Mortensen was awarded 400.000 DKK for an Instruments Grant by Carlsberg Foundation.

Professor Ulrik Gether was awarded 2.842.487 DKK by the the Medical Research Council



## 7. PUBLICATIONS 2010-2011

CBN Staff and Affiliated staff in bold, CBN Associated collaborators in italic.

### Selected papers

1. **Science**, 2010. **330 (6003): p. 502-505.** *“Fast Vesicle fusion in living cells requires at least three SNARE-complexes.”* R. Mohrmann, H. de Wit, M. Verhage, E. Neher and **J.B. Sørensen**
2. **Nature Methods**, 2010. **7: p. 1003-1008.** *“Accessible new amphiphiles for solubilization and crystallization of membrane proteins.”* P.S. Chae, S.G.F. Rasmussen, R. Rana, K. Gotfryd, R. Chandra, M.A. Goren, A.C. Kruse, S. Nurva, C.J. Loland, Y. Pierre, D. Drew, J.L. Popot, D. Picot, B.G. Fox, L. Guan, **U. Gether**, B. Kobilka and S.H. Gellman
3. **Nature Nanotechnology**, in press. *“Mixing sub-attolitre volumes in a quantitative and highly parallel manner with soft matter nanofluidics.”* S.M. Christensen, P.Y. Bolinger, **N.S. Hatzakis**, M.W. Mortensen and **D. Stamou**
4. **Nature Physics**, 2011. **Advance online publication.** *“Quantifying how DNA stretches melts and changes twist under tension.”* P. Gross, N. Laurens, **L.B. Oddershede**, U. Bockelmann, E.J.G. Peterman and G.J.L. Wuite
5. **Pharmacological Reviews**, 2011. **Jul 13 (E-pub ahead of print).** *“The SLC6 neurotransmitter transporters: Structure, function, and regulation.”* A.S. Kristensen, J. Andersen, T.N. Jørgensen, L. Sørensen, J. Eriksen, C.J. Loland, K. Strømgaard and **U. Gether**
6. **Physical Review Letters**, 2011. **106: p. 048103.** *“In vivo anomalous diffusion and weak ergodicity breaking of lipid granulus.”* J.H. Jeon, V. Tejedor, S. Burov, E. Karki, C. Selhuber, K. Berg-Sørensen, **L.B. Oddershede** and R. Metzler
7. **Proc. Natl. Acad. Sci. (USA)**, 2010. **107: p. 413-418.** *“Identification of a small molecule inhibitor of the PICK1 PDZ domain that inhibits hippocampal LTP and LTD.”* T.S. Thomsen, **K.L. Madsen**, N. Rebola, M. Rathje, V. Anggono, A. Bach, I.S. Moreira, N. Stuhr-Hansen, T. Dyhring, D. Peters, T. Beuming, R. Haganir, H. Weinstein, C. Mulle, K. Strømgaard, L.C. Rønn and **U. Gether**
8. **Proc. Natl. Acad. Sci. (USA)**, 2010. **107 (43): p. 18463-18468.** *“Role of synaptobrevin C-terminus in fusion pore formation.”* A.N. Ngatchou, K. Kisler, O. Fang, **A.M. Walter**, Y. Zhao, **J.B. Sørensen** and M. Lindau
9. **Proc. Nat. Acad. Sci.**, 2011. **108: p. 1874-1878** *“A reconciliation of opposing views on membrane-sugar interactions.”* H.D. Andersen, C. Wang, **L. Arleth**, G.H. Peters and P. Westh
10. **Journal of Nanomedicine**, 2010. **6: p. 504.** *“Perspectives David versus Goliath.”* J. Mollenhauer, **D. Stamou**, A. Flyvbjerg, J. Wengel, **U. Gether**, J. Kjems, **T. Bjørnholm**, F. Besenbacher

## Articles published 2010-2011

1. **ACS NANO**, 2010. **4**: p. 2256-2262. "Direct measurements of heating by electromagnetically trapped gold nanoparticles on supported lipid bilayers." **P. M. Bendix**, S. N. S. Reihani and **L. B. Oddershede**
2. **Bioconjugate Chemistry**, 2010. **21**: p. 1056. "Optically Induced Linking of Protein and Nanoparticles to Gold Surfaces." K. Moth-Poulsen, V. Kofod-Hansen, F. S. Kamounah, **N. H. Hatzakis**, **D. G. Stamou**, K. Schaumburg and J. B. Christensen
3. **Biophysical Journal**, 2010. **98 (7)**: p. 1200-1208. "The structure and size distribution of synaptic vesicles determined by small-angle x-ray scattering." S. Castorph, D. Riedel, R. Jahn, M. Holt, **L. Arleth**, M. Sztucki and T. Salditt
4. **Biophysical Journal**, 2010. **98**: p. 1364-1372. "Quantitative analysis of single particle trajectories: mean maximal excursion method." V. Tejedor, O. Benichou, R. Voituriez, R. Jungmann, F. Simmel, C. Selhuber-Unkel, **L. B. Oddershede** and R. Metzler
5. **Biophysical Journal**, 2010. **98**: p. 1873. "Influence of Lipid heterogeneity and phase behavior on Phospholipase A2 action at the single molecule level." M. Gudmand, S. Rocha, **N. H. Hatzakis**, K. Peneva, K. Mullen, **D. Stamou**, H. Uji-I, J. Hofkens, T. Heimburg and **T. Bjørnholm**
6. **Biophysical Journal**, 2011. **100 (4)**: p. 957. "Single Vesicle Assaying of SNARE-Synaptotagmin Driven Fusion Reveals Fast and Slow Modes of Both Docking and Fusion and Intra-sample Heterogeneity." S. M. Christensen, M. W. Mortensen and **D. G. Stamou**
7. **Biomacromolecules**, 2010. **11**: p. 3571-3577. "Molecular characterization of the interaction between siRNA and PAMAM G7 dendrimers. by SAXS, ITC and molecular dynamics simulations." L. B. Jensen, **K. Mortensen**, G. M. Pavan, M. R. Kasimova, D. K. Jensen, V. Gadzhieva, H. M. Nielsen, C. Foged
8. **Biosensors and Bioelectronics**, 2010. **26**: p. 1528-1535. "Fully integrated monolithic optoelectronic transducer for real-time protein and DNA detection: The NEMOSLAB approach." K. Misiakos, P. S. Petrou, S. E. Kakabakos, D. Yannoukakos, H. Contopanagos, T. Knoll, T. Velten, M. DeFazio, L. Schiavo, M. Passamano, **D. G. Stamou** and G. Nounesis
9. **Chem. Chem. Phys.**, 2010. **13**: p. 3161-3170. "Small-angle scattering from phospholipid nanodiscs: Derivation and refinement of a molecular constrained analytical model form factor." **N. Skar-Gislinge** and **L. Arleth**
10. **Combinatorial Chemistry & High Throughput Screening**, 2011. **14**: p. 590-600. "A Fluorescence Polarization Based Screening Assay for Identification of Small Molecule Inhibitors of the PICK1 PDZ Domain". **T. S. Thorsen**, **K. L. Madsen**, T. Dyhring, A. Bach, D. Peters, K. Strømgaard, L. C. B. Rønn and **U. Gether**



11. **Computer Physics Communications**, 2011. **30**: p. **349-358**. "*TimesSeriesStreaming.vi: LabVIEW program for reliable data streaming of large analog time series.*" F. Czerwinski and **L. B. Oddershede**
12. **Crit. Rev. Toxicol.**, 2011. **41**: p. **339-368**. "*Hazard identification of particulate matter on vasomotor dysfunction and progression of atherosclerosis*". **P. Møller**, L. Mikkelsen, **L. Vesterdal**, **J. K. Folkmann**, L. Forchhammer, **M. Roursgaard**, **P. H. Danielsen** and **S. Loft**
13. **FEBS Letters**, 2010. **584**: p. **1848**, **Invited Review**. "*BAR domains, Amphipathic Helices and Membrane-Anchored Proteins use the same mechanism to sense membrane curvature.*" **K. L. Madsen**, V. K. Bhatia, **U. Gether** and **D. Stamou**
14. **Handbook of Nanophysics, Principles and Methods**, 2011. **Chapter 7**. **CPC Press, Taylor & Francis Group**. ISBN 978-1-4200-7540-3. "*Small-Scale Nonequilibrium Systems.*" P. C. F. Møller and **L. B. Oddershede**
15. **Handbook of Nanophysics, Clusters and Fullerenes**, 2011. **Chapter 26**. **CPC Press, Taylor & Francis Group**. ISBN 978-1-4200-7554-0. "*Fragmentation of Fullerenes.*" V. V. Albert, R. T. Chaney, **L. B. Oddershede**, F. E. Harris and J. R. Sabin
16. **Journal of the American Chemical Society**, 2010. **132**: p. **13713-13722**. "*Elliptical Structure of Phospholipid Bilayer Nanodiscs Encapsulated by Scaffold Proteins: Casting the Roles of the Lipids and the Proteins.*" **N. Skar-Gislinge**, **J. B. Simonsen**, **K. Mortensen**, R. Feidenhans'l, S. Sligar, B. L. Møller, **T. Bjørnholm** and **L. Arleth**
17. **Journal of the American Chemical Society**, 2010. **132**: p. **16750-16752**. "*Tandem facial amphiphiles for membrane protein stabilization*". P. S. Chae, K. Gotfryd, J. Pacyna, L. J. Miercke, S. G. Rasmussen, R. A. Robbins, R. R. Rana, C. J. Loland, B. Kobilka, R. Stroud, B. Byrne, **U. Gether** and S. H. Gellman
18. **Journal of the American Chemical Society**, 2011. **133**: p. **10685-10687**. "*Observation of Inhomogeneity in the Lipid Composition of Individual Nanoscale Liposomes.*" **J. Larsen**, **N.S. Hatzakis** and **D. Stamou**
19. **J. Applied Cryst.**, 2010. **43**: p. **837-849**. "*Analysing the nanoporous structure of aramid fibres.*" B. R. Pauw, M. E. Vigild, **K. Mortensen**, J. W. Andreasen, E. A. Klop, D. W. Breiby and O. Bank
20. **J. Appl. Cryst.**, 2010. **43**: p. **1084-1091**. "*An analytical model for the small-Angle Scattering of stealth liposomes.*" **L. Arleth** and C. Vermehren
21. **J. Biol. Chem.**, 2010. **285**: p. **10924-38**. "*The amino terminus of monoamine transporters is a lever required for the action of amphetamines*". S. Sucic, S. Dallinger, B. Zdrzil, R. Wiessensteiner, T. N. Jørgensen, N. M. Holy, O. Kudlacek, S. Seidel, J.H. Cha, **U. Gether**, A. H. Newman, G. F. Ecker, M. Freissmuth and H.H. Sitte

22. **J. Biol. Chem.**, 2010. 285: p. 27289-27301. "Postendocytic sorting of constitutively internalized dopamine transporter in cell lines and dopaminergic neurons". **J. Eriksen**, W. E. Bjørn-Yoshimoto, T. N. Jørgensen, A. H. Newman and **U. Gether**
23. **Journal of Biol. Chem.**, 2010. 285 (42): p. 32486. "Membrane curvature induction and tubulation is a common feature of synucleins and apolipoproteins." J. Varkey, J. M. Isas, N. Mizuno, M. B. Jensen, V. K. Bhatia, C. C. Jao, J. Petrlova, J. Voss, **D. Stamou**, A. C. Steven and R. Langen
24. **Journal of Nanomedicine**, 2010. 6: p. 504. "Perspectives David versus Goliath". J. Mollenhauer, **D. Stamou**, A. Flyvbjerg, J. Wengel, **U. Gether**, J. Kjems, **T. Bjørnholm**, F. Besenbacher
25. **J. Neurochemistry**, 2010. 113: p. 27-41. "Regulation of dopamine transporter function by protein-protein interactions: new discoveries and methodological challenges (review)". **J. Eriksen**, T.N. Jørgensen and **U. Gether**
26. **Journal of Optics**, 2011. 13: p. 044020. "Optimizing active and passive calibration of optical tweezers." M. Andersson, F. Czerwinski and **L. B. Oddershede**
27. **J. Physics.**, 2010. 98: p. 1200-1208. "Synaptic Vesicles studied by SAXS: derivation and validation of a model form factor." S. Castorph, **L. Arleth**, M. Sztucki, U. Vainio, S. K. Ghosh, M. Holt, S. Ahmed, R. Jahn and T. Salditt
28. **Journal of Structural Biology**, 2011. 174: p. 11-22. **Sensors**, 2010. 10: p. 11352, **Invited Review**. "A Structural Analysis of M protein in coronavirus assembly and morphology." B. W. Neuman, G. Kiss, A. H. Kunding, D. Bhella, M. F. Baksh, S. Connelly, B. Droese, J. P. Klaus, S. Makino, S. G. Sawicki, S. G. Siddell, **D. G. Stamou**, I. A. Wilson, P. Kuhn and M. J. Buchmeier
29. **Langmuir**, 2011. 27 (3): p. 866. "Monitoring Aggregation of Single Casein Micelles using Fluorescence." J. Bomholt, K. Moth-Poulsen, M. Harboe, A. O. Karlson, K. B. Qvist, **T. Bjørnholm** and **D. G. Stamou**
30. **Macromolecular Chemistry & Physics**, 2010. 211: p. 635-643. "Correlation between Morphology, Water Uptake, and Proton Conductivity in Radiation Grafted Proton Exchange Membranes." S. Balog, U. Gasser, **K. Mortensen**, L. Gubler, H. Ben, G. G. Scherer
31. **Macromolecule**, 2011. 44: p. 575-582. "Perforated lamellae morphology in novel P2VP-b-(PDMS-b-PI-b-PS)<sub>2</sub> 3-miktoarm star quarterpolymer from Rheo-SANS and Dissipative Particle Dynamics." **J. J. K. Kirkensgaard**, P. Fragouli, N. Hadjichristidis and **K. Mortensen**
32. **Nanoletters**, 2010. 10: p. 1927-1930. "Two-photon quantum dot excitation during optical trapping." L. Jauffred and **L. B. Oddershede**
33. **Nanoletters**, 2011. 11: p. 888-892. "Heat Profiling of 3D Optically Trapped Gold Nanoparticles using Vesicle Cargo Release." **A. Kyrsting**, **P. M. Bendix**, **D. G. Stamou** and **L. Oddershede**



34. **Nature Methods**, 2010. **7**: p. **1003-1008**. "Accessible new amphiphiles for solubilization and crystalization of membrane proteins". P. S. Chae, S. G. F. Rasmussen, R. Rana, K. Gotfryd, R. Chandra, M. A. Goren, A. C. Kruse, S. Nurva, C. J. Loland, Y. Pierre, D. Drew, J. L. Popot, D. Picot, B. G. Fox, L. Guan, **U. Gether**, B. Kobilka and S. H. Gellman
35. **Nature Physics**, 2011. **Advance online publication**. "Quantifying how DNA stretches, melts and changes twist under tension." P. Gross, N. Laurens, **L. B. Oddershede**, U. Bockelmann, E. J. G. Peterman and G. J. L. Wuite
36. **Neuropharmacology**, 2011. **60**: p. **182-190**. "The binding sites for benzotropines and dopamine in the dopamine transporter overlap." H. Bisgaard, M. Andreas, B. Larsen, S. Mazier, T. Beuming, A. H. Newman, H. Weinstein, L. Shi, C. J. Loland and **U. Gether**
37. **Neutrons in Soft Matters**, 2010. p. **29-56** (Ed. Toyoko Imae, Wiley Publ.). "Small-Angle Neutron Scattering (SANS) at Reactor Sources." **K. Mortensen**
38. **Optics Express**, 2010. **18**: p. **22722-22733**. "Real-time Particle Tracking at 10,000 fps using Optical Fiber Illumination." O. Otto, F. Czerwinski, J. L. Gornall, G. Stober, **L. B. Oddershede** and U. F. Keyser
39. **Org. Biomol. Chem.**, 2010. **8**: p. **4281-4288**. "Structure-activity relationships of a small-molecule inhibitor of the PDZ domain of PICK1". A. Bach, N. Stuhr-Hansen, **T. S. Thorsen**, N. Bork, I. S. Moreira, K. Frydenvang, S. Padrah, S. B. Christensen, **K. L. Madsen**, H. Weinstein, **U. Gether** and K. Strømgaard
40. **Pharmacological Reviews**, 2011. **Jul 13 (E-pub ahead of print)**. "The SLC6 neurotransmitter transporters: Structure, function, and regulation." A. S. Kristensen, J. Andersen, T. N. Jørgensen, L. Sørensen, **J. Eriksen**, C. J. Loland, K. Strømgaard and **U. Gether**
41. **Phys. Chem. Chem.**, 2010. **12**: p. **8856-8862**. "Shear induced Nematic Ordering Oscillations in a Wormlike Micellar System as Probed by Rheo-SANS." R. Angelico, C. O. Rossi, L. Ambrosone, G. Palazzo, **K. Mortensen** and U. Olsson
42. **Physical Chemistry Chemical Physics**, 2011. **13**: p. **3139-3152**. "Novel Lyotropic Liquid Crystal Formed by Triphilic Linactants: Lydrophilic/Oleophilic/Fluorophilic Rods Arranged in a 12.6.4 Tiling. Liliana de Campo, Trond Varslot, Minoo Moghaddam." **J. J. K. Kirkensgaard**, **K. Mortensen** and S. Hyde
43. **Polymer**, 2010. **51**: p. **4589-4598**. "Strain-induced internal fibrillation in looped aramid filaments." B. R. Pauw, M. E. Vigild, **K. Mortensen**, J. W. Andreasen, E. A. Klop, D. W. Breiby and O. Bunk
44. **Proc. Natl. Acad. Sci. (USA)**, 2010. **107**: p. **413-418**. "Identification of a small molecule inhibitor of the PICK1 PDZ domain that inhibits hippocampal LTP and LTD." T. S. Thomsen, **K. L. Madsen**, N. Rebola, M. Rathje, V. Anggono, A. Bach, I.S. Moreira, N. Stuhr-Hansen, T. Dyhring, D. Peters, T. Beuming, R. Haganir, H. Weinstein, C. Mulle, K. Strømgaard, L. C. Rønn and **U. Gether**

45. **Proc. Natl. Acad. Sci. (USA)**, 2010. **107 (43): p. 18463-18468.** "Role of synaptobrevin C-terminus in fusion pore formation." A. N. Ngatchou, K. Kisler, O. Fang, **A. M. Walter**, Y. Zhao, **J. B. Sørensen** and M. Lindau
46. **Proc. Nat. Acad. Sci.**, 2011. **108: p. 1874-1878.** "A reconciliation of opposing views on membrane-sugar interactions." H. D. Andersen, C. Wang, **L. Arleth**, G. H. Peters and P. Westh
47. **Physical Review Letters**, 2011. **106: p. 048103.** "In vivo anomalous diffusion and weak ergodicity breaking of lipid granulus." J. H. Jeon, V. Tejedor, S. Burov, E. Karki, C. Selhuber, K. Berg-Sørensen, **L. B. Oddershede** and R. Metzler
48. **Review of Scientific Instruments**, 2010. **81: p. 015103-(1-10)** is featured in **Virtual Journal of Biological Physics research**, 2010. **19 issue 2.** "Active-passive calibration of optical tweezers in viscoelastic media." M. Fisher, A. Richardson, S. N. S. Reihani, **L. B. Oddershede** and K. Berg-Sørensen
49. **Science**, 2010. **330 (6003): p. 502-505.** "Fast Vesicle fusion in living cells requires at least three SNARE-complexes." R. Mohrmann, H. de Wit, M. Verhage, E. Neher and **J.B. Sørensen**
50. **Seminars in Cell Developmental Biology**, 2010. **21: p. 381, Invited Review.** "A unifying Mechanism Accounts for Sensing of Membranes Curvature by BAR domains, Amphipathic Helices and Membrane-anchored proteins." V.K. Bhatia, **N.S. Hatzakis** and **D. Stamou**
51. **Sensors**, 2010. **10: p. 11352, Invited Review.** "Sensing-Applications of Surface-Based Single Vesicle Arrays" S.M. Christensen and **D.G. Stamou**
52. **Traffic**, 2010. **11 (11): p. 1415-1428.** "Rab3 proteins involved in vesicle biogenesis and priming in embryonic mouse chromaffin cells." J-S. Schonn, J.R.T. van Weering, R. Mohrmann, O.M. Schlüter, T.C. Südhof, H. de Wit, M. Verhage and **J.B. Sørensen**
53. **Tox. Lett.**, 2011. **203: p. 181-189.** "Effect of vitamin C and iron chelation on diesel exhaust particle and carbon black induced oxidative damage and cell adhesion molecule expression in human endothelial cells." H. Frikke-Schmidt, **M. Roursgaard**, J. Lykkesfeldt, **S. Loft**, J.K. Nøjgaard and **P. Møller**
54. **Nature Nanotechnology**, published online 30 October doi; 10.1038/nnano2011.11.185. "Mixing sub-attolitre volumes in a quantitative and highly parallel manner with soft matter nanofludics." S.M. Christensen, P.Y. Bolinger, **N.S. Hatzakis**, M.W. Mortensen and **D. Stamou**

#### Articles

55. **Analytical Chemistry**, *in press*. "Fluorescence anisotropy based single liposome assay to measure molecule-membrane curvature." **N. Ehrlicn**, A. Christensen and **D. Stamou** (in press)



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56. **Biophysical Journal**, *in press*. “Intermembrane docking reactions are regulated by membrane curvature.” A.H. Kunding, M.W. Mortensen, S.M. Christensen and **D. Stamou** (in press)



