

OVERVIEW

Name: Jonas Tegenfeldt

Gender: Male

Citizenship: Swedish

Contact information:

Division of Solid State Physics

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Current appointments

2014-present Professor in Nanophysics at the Division of Solid State Physics, Lund University, Lund, Sweden (tenured / Swe: “tillsvidareanställd”)

Key research interests

Label-free particle sorting – Tegenfeldt's group pioneered a unique microfluidic cell-sorting scheme that fractionates cells based on not only size but also shape and deformability. This is useful for defining subpopulations of cells based on their inherent mechanical properties, a characteristic that is finding increased interest in cell biology.

DNA analysis in nanochannels – Tegenfeldt invented the usage of nanochannels to stretch DNA and further developed the concept in his group by introducing a simple labeling scheme that results in a barcode pattern that can be used to identify large-scale genomic structures in long DNA molecules.

Nanoscale injection needles – Tegenfeldt's group has demonstrated proof of principle of hollow nanowires for use as nanoscale injection needles for single cells.

Teaching

Development of course in Experimental Biophysics that is running since 2004 under my leadership. Main advisor for four PhD students, one of whom has graduated as PhD and one as Licentiate. Host for six postdocs and senior researchers. Advisor for 19 master projects.

Grants

Project grants from VR, EU, VINNOVA, HFSP totaling more than 20MSEK.

2008-2014 VR-financed “Rådsforskare” (Eng: Senior Research Fellowship Award)

2003-2008 VR-financed “Forskarassistent” (Eng: Assistant Professor)

DETAILED INFORMATION

Past appointments

- 2008-2012 Associate professor (Docent/Forskare) at the Division of Solid State Physics, Lund University, Lund, Sweden (tenured / Swe: "tillsvidareanställd") (40% part Dec 2008-Dec 2012; 100% Jan 2013-May2014)
- 2011-2012 Associate professor (Docent/Universitetslektor) at the Department of Physics, University of Gothenburg, Göteborg, Sweden (60% part time as of April 2011)
- 2008-2011 Associate professor (Docent/Forskare) at the Department of Physics, University of Gothenburg, Göteborg, Sweden (60% part time Dec 2008 – March 2011)
- 2003-2008 Assistant professor (Forskarassistent) at the Division of Solid State Physics, Lund University, Lund, Sweden
- 2001-2003 Research Staff Member at the Department of Molecular Biology, Princeton University, Princeton, New Jersey, US (Postdoctoral research at Princeton University in the laboratories of Prof. E. C. Cox and Prof. R. H. Austin)
- 1998-2000 Research Associate at the Department of Molecular Biology, Princeton University, Princeton, New Jersey, US (Postdoctoral research at Princeton University in the laboratories of Prof. E. C. Cox and Prof. R. H. Austin)
- 1992-1997 Research associate (doktorandtjänst) at the Division of Solid State Physics, Lund University, Lund, Sweden (Graduate studies in the group of Lars Montelius)

Education and degrees

- 2007 Docent in Solid State Physics (Lund University)
- 1997 Doctor of Philosophy (Ph.D.) in Engineering, Lund University with thesis: "Nanofabrication and Characterization for Applications in Biochemistry and Molecular Electronics"
- 1991 Master of Science, Engineering Physics, Uppsala University with Masters thesis: "Atomic Force Microscopy" carried out at the Division of Solid State Physics Lund

Pedagogical Training

- 2010 Course in lecturing, Lund University (2 weeks) (Swe: Den goda föreläsningen)
- 2010 Workshop on the pedagogical portfolio (1 week)
(Swe: Workshop – den pedagogiska portföljen, HT 2010)
- 2004 Lectureship course (Docentkursen), Lund University (1 week)
(Swe: Docentkurs på LTH)
- 2004 Course in research mentorship, Lund University (2 days)
(Swe: Forskarhandledning – ett utbildningsuppdrag med möjligheter)
- 2003 Introductory course in pedagogy for higher education, Lund University (2 weeks)
(Swe: Högskolepedagogisk introduktionskurs)

Class-room teaching

My main teaching responsibility is an interdisciplinary course in experimental biophysics, which I been given each spring semester since 2004 for approximately 15 students each year:

Experimental Biophysics (Tegenfeldt's role: main lecturer, responsible for leadership) – upper undergraduate and introductory graduate level course running each spring and developed by Tegenfeldt (year 2004) at Lund University (codes FYST23, TEK265, FFFN20 and FAF010F), one semester, half speed (15hp) <http://nanobio.ftf.lth.se/~biokurs/>

In addition I give regular guest lectures, e.g. a yearly lecture in "Biology of the cell" (TEK295).

Research group leadership

PhD students

PhD students for whom I am the main advisor are listed above the black bar and those for whom I am the co-advisor are listed below. There are two additional positions that are under recruitment at the moment for microfluidic cell sorting based on physical properties.

Name	Subject	Starting year	Status	Role of Tegenfeldt
Hoai Trung Tran Si	Mechanical properties of cancer cells	2014	start SEP 2014	main advisor
Stefan Holm	Deterministic sorting devices for diagnostics	2012	ongoing	main advisor
Henrik Persson	Interactions between nanowires and cells	2009	ongoing	main advisor
Camilla Freitag	DNA analysis in nanochannels	2009	Lic 7 JUNE 2013	main advisor
Jason Beech	Microfluidics-Separation and Analysis of Biological Particles	2006	PhD 22 NOV 2011	main advisor
Cassandra Niman	Molecular ratchets	2009	ongoing	coadvisor
Gabriel Ohlsson	Small-Scale Sample Handling for Studies of Liquid Crystals and Lipid-Based Soft Matter	2009 (as Lic)	PhD 4 MAY 2012	coadvisor

Postdocs and senior guests

Current postdocs are listed above the black bar and former postdocs are listed below.

Name	Subject	Period	Current activity
Dr Jason Beech	DNA extraction from bacteria	Jan 2012 - present	
Dr Joachim Fritzsche	DNA analysis in nanochannels, nanofabrication	Feb 2010 – Sep 2012	Postdoc at Chalmers University (Ass Prof Fredrik Westerlund)
Dr Katarina Logg	Simulation of DNA barcode	Oct 2010-Aug 2012	Postdoc at The Swedish Institute for Food & Biotechnology
Dr Fredrik Westerlund	DNA analysis in nanochannels	Sep 2009 – Aug 2010	Assistant Professor at Chalmers University
Dr Fredrik Persson	DNA analysis in nanochannel	Mar 2009 – Apr 2011	Postdoc Uppsala Univ (Prof Johan Elf)
Dr Walter W Reisner*	DNA analysis in nanochannel, polymer physics	2006-2007	Ass Prof at McGill University, Canada

() Walter Reisner was shared between my group at Lund University and Prof Henrik Flyvbjergs group at Risø/DTU.*

Diploma Students (Tegenfeldt main advisor)

Name	Subject	Finished
Stefano Scaramuzza	DNA analysis in nanochannels	plan Dec 2014
Anastasia Syntychaki	Hydrogel-based biosensors	plan June 2014
Susanne Norlén	Hollow nanowires as single-cell nanosyringes	Feb 2013
Stefan Holm	Shaped based sorting of blood and parasites	July 2012
Masoomeh Ghasemi	Shape and deformability in deterministic lateral displacement devices	June 2012
Eric Sandlund	Image processing of confined DNA molecules	June 2012
Farnaz Yadegari	Fluidics and Guidance in Hollow Nanowires	Dec 2011
Kalle Adolphsson	Blood sorting using deterministic lateral displacement	May 2011
Mattias Törnqvist	Droplet generation in microfluidic channels for encapsulation	Feb 2011
Jon Lind	Cell Synchronization on a chip	Oct 2008
Marcus Jansson	Single-Molecule Diffusion Measurements in Lipid Bilayers	Fall 2007
Hanna Nicklasson	Synchronization by size-fractionation on a chip	Aug 2007
Anette Lundqvist	Deterministic separation of soft microspheres	Aug 2007
Anna Mölder	Single-Molecule Detection in Living Cells	Dec 2006
Pelle Sommansson	Deterministic Cell Separation	Sep 2006
Jason Beech	Elastic Deterministic Lateral Displacement Devices - Stretching the Limits of Separation	Aug 2005
Magnus Jonsson	Integration of nanowires with microfluidics for bioapplications	Sep 2005
Jonas Berggren	Fundamentals and Limits of DNA Nanotechnology	Jan 2005
Håkan Jönsson	Microfluidics for lab-on-a-chip applications	Jan 2005

Research grants

Amount benefitting Tegenfeldt is given, if applicable together with total amount in parenthesis for multipartner grants. Currently ongoing projects are listed above the black bar and completed projects are listed below.

Title	Funding source	Period	Amount (total)	Principal investigator
Label-Free Particle Sorting - Initial Training network with 15 partners	EU - FP7/PEOPLE	2013-2017	5 MSEK (33MSEK)	Tegenfeldt
Denaturation mapping for physical mapping of genomes of key marine organisms	Hasselbladsstiftelsen	2013-2014	870kSEK (1034kSEK)	Tegenfeldt/Blomberg/Johannesson
Mechanical properties of cancer cells as a marker for diagnosis and prognosis	Barncancerfonden	2013-2016	1796kSEK (2996kSEK)	Tegenfeldt
Genetic studies of DNA with direct visualization using extremely high-resolution microscopy	Magnus Bergvalls Stiftelse	2013	60kSEK	Tegenfeldt
Project grant: "Enrichment of rare cells and parasites using label-free particle sorting"	VR	2012-2014	2.6 MSEK	Tegenfeldt
Senior Research Fellowship Award (rådsforskare): "Cellbiology and biophysics in microfabricated environments"	VR	2008-2014	6 MSEK	Tegenfeldt
FoI miljöansökan Innovationer för framtidens hälsa: "Generic sensor devices for diagnostics and drug screening"	VINNOVA	2009-2013	2.3 MSEK (12 MSEK)	Fredrik Höök (Chalmers)
Project grant: "DNA in nanoscale confined environments"	VR	2008-2010	2.3 MSEK	Tegenfeldt
EU Integrated project: "Revolutionary Approaches and Devices for Nucleic-Acid Analysis"	EU/FP7	2008-2012	550 kEUR (12 MEUR)	Ivo Gut (CNG, Paris)
Young Investigators' Grant: "The molecular mechanism of chromosome reorganization during sporulation of <i>Bacillus subtilis</i> "	HFSP	2008-2010	350 kUSD (1050 kUSD)	Tegenfeldt
Project grant: "Lab on a Chip for ssDNA"	Danish Research Council for Technology and Production	2006-2008	N/A (*) (4 MDKK)	Henrik Flyvbjerg (Risø / DTU)

	Science			
Project grant: “Microfabricated nearfield optical scanner for DNA, protein and cell studies”	VR	2003-2006	4 MSEK	Tegenfeldt
EU Integrated project: “NaPa - Emerging Nanopatterning methods”	EU/FP6	2004-2007	30 person months (**) (16 MEUR)	Jounni Ahopelto (VTT, Espoo, Finland)
Short project: “Industry related research in quantum materials”	SSF	2004	195 kSEK	Lars Samuelson

(*) Due to formal requirements from the research council no funding could be transferred outside Denmark. Experiments took place by postdoc Walter Reisner in my lab and at DTU in Denmark.

(**) Tegenfeldt not original co-PI of the project.

Other grants

Title	Funding source	Year	Amount (total)	Principal investigator
Equipment: “Autofocus system for fluorescence microscopy”	Crafoord	2012	250 kSEK	Tegenfeldt
Equipment: “Microfluidic tools for biomedical applications “	Crafoord	2008	350 kSEK	Tegenfeldt
Innovation grant (Fokus Verifiering II): “Streckkod för DNA-analys” (“Barcode for DNA analysis”)	Innovationsbron Syd AB	2010	100 kSEK	Tegenfeldt
Innovation grant (Fokus Verifiering I): “Streckkod för DNA-analys” (“Barcode for DNA analysis”)	Innovationsbron Syd AB	2008	100 kSEK	Tegenfeldt
Travel grant to give keynote lecture at ASME, Puebla, Mexico	VR	2007	27 kSEK	Tegenfeldt
Equipment: “Flow control unit and oxygen plasma unit”	Crafoord	2006	240 kSEK	Tegenfeldt
Equipment: “Experimental confocal microscope“	Crafoord	2005	350 kSEK	Tegenfeldt

Industrial connections

2011 – present: QuNano AB, Lund Sweden – ongoing collaborative projects on nanofluidics

2004 – present: QuMat Technologies AB, Lund, Sweden – co-owner (nanowire technology)

Key patents on DNA analysis essential for startup of two companies: BioNanoGenomics (formerly known as Bionanomatrix; founder Dr Han Cao; capital raised ~10MUSD), and Pathogenetix (formerly known as USGenomics; founder Eugene Chan; capital raised ~100MUSD).

Service

Membership of PhD dissertation committees / opponent (Swe: betygskommitté/opponent)

Yajing Song (April 2014), thesis advisor Olof Emanuelsson [JT opponent]

Hainchun Liu (Mar 2014), thesis advisors Stefan Andersson-Engels and Thomas Laurell

Niklas Bosaeus (Dec 2013), thesis advisors Bengt Nordén and Björn Åkerman, Chalmers University

Alar Ainla (Mar 2013), thesis advisors Owe Orwar and Aldo Jesorka, Chalmers University

Per Augustsson (DEC 2011), thesis advisors Thomas Laurell and Johan Nilsson, Lund University

Lucia Cinque (May 2011), thesis advisor Aaron Bensimon [JT - rapporteur de thèse/opponent]

Maria Millingen (May 2009), thesis advisor Prof. Owe Orwar

Simon Mitternacht (April 2009), thesis advisor Dr. Anders Irbäck

Oleg Mirzov (May 2008), thesis advisor Dr. Ivan Scheblykin, Lund University

Per Björk (December 2007), thesis advisor Prof Olle Inganäs, Linköping University

Michal Tokarz (January 2007), thesis advisor Prof Orwar / Björn Åkerman, Chalmers

Fredrik Westerlund (December 2006), thesis advisor Prof Nordén, Chalmers

Lennart Bitsch (May 2006), thesis advisor Prof Bruus, DTU

Charlotte Larsson (May 27, 2005), thesis advisor Prof Kasemo, Chalmers

Johan Pihl (May 18, 2005), thesis advisor Prof Orwar, Chalmers

Jon Sinclair (April 22, 2005), thesis advisor Prof Orwar, Chalmers

Referee for journals such as: Nanotechnology, Biosensors&Bioelectronics, Electrophoresis, Applied Nanoscience, Analytical and Bioanalytical Chemistry, PRL, J of Micromechanics and Microengineering, IEEE Trans on Adv Packaging, Nature Communications

Host for seminar series at Physics / University of Gothenburg “New Developments in Biological Physics” 2009-2011.

Grant reviewer for European Science Foundation, European Research Council, Danish Research Council for Technology and Production Sciences (FTP), Swiss National Science Foundation, DARPA, Israel Science Foundation, The Research Council of Norway, Health and Medical Research Fund (HMRF, Hong Kong); Swedish Research Council

Organizing committee of the 2nd Symposium on Semiconductor Nanowires, focus Life Science, Oct 1-2, 2006, Lund, Sweden

Steering Committee and the Scientific Committee of *The Annual European Conference on Micro & Nanoscale Technologies for the Biosciences* (NanoBioTech Montreux) (2007-present); Chair for the conference for year 2014.

MicroTAS 2014 Technical Program Committee.

Management group at the Division of Solid State Physics at the Department of Physics at Lund University (2008-present)

Editorial board of *Nanotechnology* (Institute of Physics, IOP) (2008-2009).

Editorial board of *Biomicrofluidics* (American Institute of Physics, AIP) (2008-2009)

Postdoc fellowship for research at Princeton University during 1998 and 1999 (Wenner-Gren Center Foundation for Scientific Research, 2x100kSEK)

Miscellaneous

1984-1985 University of Pennsylvania: auditing Physics and Math; undergraduate project with Prof Greg Farrington, Philadelphia, PA, USA

1985-1986 Swedish Defense Institute of Language/Uppsala University, Sweden

1990-1991 Graduate studies at the Stockholm School of Economics (1st year), Stockholm, Sweden