BJÖRN HÖGBERG – CV

WEBPAGE: WWW.HOGBERGLAB.NET -
YEAR OF BIRTH: 1975

APPOINTMENTS AND PROFESSIONAL PREPARATION

Jan 2019-

Professor of Molecular Systems Biophysics, Dept. of Medical Biochemistry and Biophysics, Karolinska Institutet

Aug 2015-Dec 2018

Associate professor (Docent), Dept. of Medical Biochemistry and Biophysics, Karolinska Institutet

Aug 2010-2014

Assistant professor (FoAss). Dept. of Neuroscience, Karolinska Institutet, Stockholm

Jan 2008-Jun 2010

Post-doctoral research fellow, Dr. William Shih's lab, Dana-Farber Cancer Institute Dept. of Cancer Biology, Harvard Medical School Dept. of Biological Chemistry & Molecular Pharmacology, Boston

2004-2007

PhD, February 2007 (Tekn. Dr) Title: DNA-Mediated Self-Assembly of Nanostructures – Theory and Experiments, Advisor: Prof. Håkan Olin, Mid Sweden University, Sundsvall

2000-2002

Licenciate of Engineering (Tekn. Lic.), Title: High-Tc Superconducting Junctions for Integrated Circuits, Advisor: Prof. Zdravko Ivanov, Chalmers University of Technology, Göteborg

1998-1999

Pensionnaire étranger de l'ENS, various physics courses, Ecole Normale Superieure, Paris

1995-2000

Master of Science in Engineering Physics (Civ. Ing. Teknisk Fysik) Uppsala University, Uppsala

RESEARCH INTERESTS

The main effort in my lab is to develop new methods and molecular tools for biological research using DNA nanostructures and moleculart biology methods. Using DNA origami we probe the effect the distance has on a number of cellular mechanisms. We are also developing a cell tagging system based on DNA origami barcode for spatial single cell sequencing (ERC project). In this effort we use superresolution microscopy, electron microscopy and next generation sequencing. We are also developing methods to extract spatial information directly from sequencing data – like imaging without a microscope (KAW project). A part of my lab is focused on research on the basics of DNA self-assembly. We work on a new design paradigm for DNA nanotechnology using a new type of triangulated meshes. Lastly, the lab develops synthetic biology methods to produce the building blocks we need for nanostructures and molecular tools, directly in bacteria with the goal of complete biotechnological production of DNA nanostructures and enzymes for the above methods.

GRANTS AND AWARDS

- Göran Gustafsson's Prize in Chemistry, 2019
- Hugo Theorell Prize in Biophysics, 2018
- K A Wallenberg project grant 2018-2022
- Wallenberg Prolongation WAF 2020-25
- ERC Consolidator 2017-21
- EU H2020 ITN DNAbot 2018-21
- Wallenberg Academy Fellow, the Knut and Alice Wallenberg Foundation, 2015-2019
- Future Research Leader fellow, Swedish Foundation for Strategic Research, 2013-2017
- Swedish Research Council (VR) young researcher project grant, 2013-2017
- EU FP7 Marie Curie Initial Training Network (ITN): Partner, EScoDNA, 2012-2016
- Swedish Research Council (VR) project grant 2010
- Swedish Medical Nanoscience Center startup grant 2010
- Swedish Res. Council (VR) Post-doctoral Fellowship, 2007

SUPERVISION AND LEADERSHIP

Head of division since 2017. PI and group leader since 2010.

Extensive leadership courses from KI and SSF (Swe. Found. For Strategic research) via the "Future Research Leader" program.

3 graduated PhD as main supervisor.

Currently main supervisor for 5 PhD students

Main supervisor for 4 Post-Docs, including 1 **Marie Curie Fellow**. 3 Post-doc alumni from my lab, including one who is currently professor.

PEER REVIEW TASKS AND COMMISSIONS OF TRUST

- **Review assignments** (repeated) from the following journals: [Nature] – [Science] – [Nature Materials] – [Nature Nanotechnology] – [J. Am. Chem. Soc.] – [ACS Nano] – [Journal of Nucleic Acids] – [PLoS ONE] – [Lecture Notes in Computer Science (LNCS)] – [ChemPhysChem] – [RSC Chemical Science] – [PhysChemChemPhys] – [Small] – [Methods] – [Advanced Materials] – [Accounts of Chemical Research] – [Nano Letters]

- **5x Opponent for PhD defences**: [Tianqiang Liu, Advisor: Kurt Gothelf, Aarhus University (2016)] – [Anders Hauge Okholm, Advisor: Jörgen Kjems, Aarhus University (2016)] – [Camilla Russel, Advisor: Mats Nilsson, Uppsala University (2015)] – [Rasmus Schøler Sørensen (Aarhus), Advisor: Jørgen Kjems (2013)] – [Thomas Tørring (Aarhus), Advisor: Kurt Gothelf, Aarhus University (2011)]

- 7x PhD Committee member at: [Olof Gissberg (KI), Advisor: Edwards Smith] – [Jonas Eriksson (Stockholm Uni.), Advisor: Ülo Langel (2016)] – [Martina Jezowska-Herrera (KI), Advisors: Malgorzata Honcharenko, Roger Strömberg] – [Sylvain Geny (KI), Advisor: Edvard Smith (2015)]– [Jakob Woller (Chalmers), Advisor: Bo Albinson (2014)] – [Anke Dierckx (Chalmers), Advisor: Marcus Willhelmsson (2014)] - [Saiful Islam (KI), Advisor: Sten Linnarsson (2013)]

- **External expert (sakkunnig)** [Uppsala University hiring Lecturer in Molecular Tools (2016)] – [EU H202, Monitor for FET-Open for grant MARA]

- **Grant reviewer** for: [The European Research Council (ERC)] – [The U.S. Army Research Laboratory's Army Research Office] – [The Danish Council for Independent Research] – [The European Commission EU FP7 (FET ATMOL, also on the review panel in Brussels)] – [Hong Kong Research Grants Council] – [The International Graduate School of Science and Engineering at TU Munich] – [Netherlands Organisation for Scientific Research (NWO)]

Teaching

More than 450 hours of teaching at: first, second and third - cycle education.

Has all required courses for higher education teaching.

Entrepeneurial achievements

2 patents and patent applications, Founder of the biotech start-up "BaseStack Labs AB"

Talks, Conference organization, programs

<**25x Invited speaker** : [Conversations at Albany, Albany 2019] - [Gordon Research Conference on RNA Nanotechnology, Ventura 2019] - [European Society of Human Genetics, Milano 2018] - [Macromolecular Structure and Function, Tällberg 2018] - [Bioelectronic Medicine, Saltsjöbaden 2018] - [FNANO Conference, Utah 2018] - [Frontiers of Science Seminars, Åbo Akademi 2018] - [GESB3 Conference, Bruges 2018] - [IMDEA-Nanoscience, Madrid 2018] - [DNATEC 17, Dresden May 2017] – [*keynote* SCANDEM, Reykjavik June 2017] - [*keynote* 2017 Life Science Symposium, University of Pavia] - [American Association for Cell Biology, San Francisco, 2016] - [iNano seminars Aarhus university, 2016] - [Kemiska Föreningen, Lund, 2016] - [10-years of DNA origami, Caltech, 2016] – [Functional DNA Nanotechnology, Rome, 2016] - [FNANO Foundations of Nanoscience conference 2015] – [Nanoscience for Human Health Conference, Gothenburg, 2015] – [*keynote* WCRM (World Conference on Regenerative Medecine) Leipzig, 2013] – [*plenary* CLINAM (Clinical Nanomedicine Conference) Basel, 2013] – [Seminar at Aalto University Helsinki, 2012] – [Soft and Biological Matter Seminars Oxford University, 2012] – [*keynote* MSW 2012 (Micronanosystems Workshop) Linköping, 2012] – [FNANO Foundations of Nanoscience conference 2012 Snowbird Utah] - [The LMU Munchen biophysics dept. winter school 2011]

- **Organizer and program chair** of the "Emerging Methods for Medical Research Conference", Nobel Forum, Stockholm, Sept. 2015 (see: www.emergmed-conf.org)

- **More than 30 other talks** - contributed, general public talks.

- **One of the initiators and partner** of EU H2020 Innovative Training network (ITN) DNAbot (2018-21). And the "European School of DNA Nanotechnology", EScoDNA, Initial Training Network, FP7 (2013-2016)

Experimental Expertise

DNA nanostructure design and preparation, extensive programming experience, DNA-protein conjugation, DNA- and protein protocols, cloning, protein expression, phage expression, electrophoresis, superresolution microscopy, TEM of macromolecules, Cryo EM, AFM of solid state materials and biological samples (dry and in liqud), next-gen sequencing and bioinformatics.

10 Selected Publications

Full list link at Google Scholar: Citations: 2956, h-index: 13

Shaw A, Hoffecker IT, Smyrlaki I, Rosa J, Grevys A, Bratlie D, Sandlie I, Michaelsen TE, Andersen JT & Högberg B, Binding to Nanopatterned Antigens is Dominated by the Spatial Tolerance of Antibodies, *Nature Nanotechnology* **14**, p. 184 (2019)

Benson E, Mohammed A, Bosco A, Teixeira AI, Orponen P & Högberg B, Computer-Aided Production of Scaffolded DNA Nanostructures from Flat Sheet Meshes, *Angew. Chem. Int. Ed.*, **55** p. 8869 (2016)

Benson E, Mohammed A, Gardell J, Masich S, Czeizler E, Orponen P and Högberg B, DNA rendering of polyhedral meshes at the nanoscale, *Nature*, **523** p. 441 (2015)

Shaw A, Benson E and Högberg B., Purification of Functionalized DNA Origami Nanostructures, *ASC Nano,* **9** p. 4968 (2015)

Ducani C, Bernardinelli G and Högberg B, Rolling circle replication requires single-stranded DNA binding protein to avoid termination and production of double-stranded DNA, *Nucleic Acids Research*, **42** p. 10596 (2014)

Shaw A, Lundin V, Petrova E, Fördős F, Benson E, Al-Amin A, Herland A, Blokzijl A, Högberg B* and Teixeira A* (*co-directed), Spatial control of membrane receptor function using ligand nanocalipers, *Nature Methods*, **11** p. 841 (2014)

Ducani C, Kaul C, Moche M, Shih WM and Högberg B, Enzymatic production of 'monoclonal stoichiometric' single-stranded DNA oligonucleotides, *Nature Methods*, **10**, p. 647 (2013)

Zhao YX, Shaw A, Zeng X, Benson E, Nyström AM and Högberg B., DNA origami delivery system for cancer therapy with tunable release properties, *ASC Nano,* **6**, p. 8684 (2012)

T. Liedl, B. Högberg, J. Tytell, D. Ingber and W.M. Shih, Self-assembly of three-dimensional prestressed tensegrity structures from DNA, *Nature Nanotechnology*, **5**, p. 520 (2010)

S. Douglas, H. Dietz, T. Liedl, B. Högberg, F. Graf and W. Shih, Self-assembly of DNA into nanoscale three-dimensional shapes, *Nature*, **459**, p. 414 (2009)