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

We develop new methods and molecular tools for biological research using DNA nanostructures and molecular 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). We also work on a new design paradigm for DNA nanotechnology using a new type of triangulated meshes. Lastly, we develop synthetic biology methods to produce our building blocks directly in bacteria with the goal of complete biotechnological production of DNA nanostructures and enzymes for the above methods.

NOTABLE GRANTS AND AWARDS

- KAW & SciLifeLab National COVID19 program grant, 2020
- Vetenskapsrådet Medicine and Health project grant, 2020
- **Göran Gustafsson's Prize in Chemistry**, 2019
- Hugo Theorell Prize in Biophysics, 2018
- KI StratRegen SFO grant, 2019
- K A Wallenberg project grant 2018-2022
- Wallenberg Prolongation WAF 2020-25
- ERC Consolidator 2017-21
- EU H2020 ITN DNA Robotics 2019-22
- 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.

4 graduated PhDs as main supervisor.

Currently main supervisor for 6 PhD students

Main supervisor for 3 Post-Docs, 4 Post-doc alumni from my lab, including one currently professor and one currently assistant 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.] – [Angew. Chem.] – [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] – [Adv. Healthcare Materials]

- **6x Opponent for PhD defences**: [Johan Björkesten, Advisor: Ulf Landegren (2019)] - [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)]

- 10x PhD Committee member at: [Hampus Karlsson (KI), Advisor Katja Petzold] - [Felix Neumann (SU), Advisor: Mats Nilsson] – [Lorenzo Baronti (KI), Advisor: Katja Petzold] – [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)** [Aarhus University hiring assistant and associate professors in nanomedicine] - [Uppsala

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

- **Grant reviewer** for: [Swedish Research Council Medicine and Health] - [Swiss National Science Foundation] - [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

3 patents, Founder of the biotech start-up "BaseStack Labs AB" (now defunct), Co-founder of "Moligo Technologies AB"

TALKS, CONFERENCE ORGANIZATION, PROGRAMS

>30x Invited or Keynote speaker: [Opportunities in Biosensing, Columbia Univ. 2020] - [IEEE NMDC Conf., Stockholm 2019] - [FEBS Conference, Cracow 2019] - [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]

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

- **More than 40 other talks** - contributed, general public talks.

- **One of the initiators and partner** of EU H2020 Innovative Training network (ITN) DNA Robotics (2018-21). And the 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: 4464, h-index: 17

Wang Y, Benson E, Fördös F, Lolaico M, Baars I, Fang T, Teixeira AI & Högberg B, DNA Origami Penetration in Cell Spheroid Tissue Models is Enhanced by Wireframe Design, *Advanced Materials* **33**, p. 2008457 (2021)

Smyrlaki I, Ekman M, Antonio Lentini A, ..., Högberg B & Reinius B, Massive and rapid COVID-19 testing is feasible by extraction-free SARS-CoV-2 RT-PCR, *Nature Communications* **11**, p. 4812 (2020)

Hoffecker I, Yang Y, Bernardinelli G, Orponen P & Högberg B, A computational framework for DNA sequencing microscopy, *PNAS* **116**, p. 19282 (2019)

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, 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)

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)