

Ian T. Hoffecker

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PROFESSIONAL EXPERIENCE

Postdoctoral Researcher

Mar 1, 2015 -

Present

Karolinska Institutet, Department of Medical Biochemistry and Biophysics (MBB)

Supervisor: Björn Högberg

Research focus: DNA sequencing-based microscopy and DNA computing

EDUCATION

- PhD in Polymer Science, Nov 25, 2014, Kyoto University
- M.S. in Biomedical Engineering, Dec 17, 2010, Carnegie Mellon University
- B.S. in Chemical Engineering, Aug 14, 2009, University of Colorado

MERITS AND AWARDS

- 2019 Poster Award - Breakthrough Category, NANTECH 2019, Helsinki Finland
- 2017 Åke Wiberg Stiftelse Grant for Medical Research 200000 Kr
- 2015 Biomaterials 2015 Top Images poster Biomaterials, Elsevier
- 2014 Cover feature: Tissue Engineering Part A (June 2014 Volume 20 no 11-12)
- 2013 Advanced Healthcare Materials Poster Award – FEBS-ESF Biosurfaces Conference
- 2012 Excellent Poster Award (iPad Mini), Kyoto Institute of Polymer Science Symposium
- 2011 Japan Ministry of Education, Culture, Sports, Science (MEXT) National PhD Fellowship
- 2009 Carnegie Institute of Technology Dean's Fellowship
- 2009 CU Active Learning Award for Professional, Discovery, and Service-Based Learning
- 2009 ConocoPhillips Earn-Learn Apprenticeship
- 2009 CU Engineering Fellows
- 2009 USDOC/NIST - PREP Professional Research Experience Program Scholarship/Internship

TEACHING

Karolinska Institutet Dept. Medical Biophysics and Biochemistry Teaching

- Fall 2019: **Human physiology - Course Organizer: Olof Rådmark**
Nucleic Acids Biochemistry Seminar
- Spring 2019: **Human physiology - Course Organizer: Olof Rådmark**
Nucleic Acids Biochemistry Seminar
- Spring 2019: **Bioinformatics - Course Organizer: Jan-Olov Höög**
Obtaining Multiple Sequence Alignments and HMMs Lecture
- Spring 2019: **Bioinformatics - Course Organizer: Jan-Olov Höög**
Multiple Sequence Alignment and BLAST Lecture
- Spring 2019: **Bioinformatics - Course Organizer: Jan-Olov Höög**
Pairwise Sequence Comparison Lecture
- Spring 2018: **Bioinformatics - Course Organizer: Jan-Olov Höög**
Pairwise Sequence Comparison Lecture
- Spring 2018: **Bioinformatics- Course Organizer: Jan-Olov Höög**
Introduction to Programming in Python Lecture
- Spring 2018: **Bioinformatics- Course Organizer: Jan-Olov Höög**
Pairwise Sequence Comparisons Computer Lab Session

Students Mentored

- Fall 2019: **Igor Baars**
DNA Sequencing-Based Microscopy from Bridge PCR
- Spring 2019: **Viktoria Sorokina**
Markov Chain Monte Carlo Simulation of Antibody Walking on Nanopatterned Antigens Master's thesis
- Spring 2018: **Yunshi Yang**
Spatial Adjacency Mapping by Sequence Master's thesis
- Spring 2017: **Yunshi Yang**
Super resolution imaging by sequencing - in silico proof of concept. Master's rotation
- Summer 2017: **Larsen Vornholz**
Spatial inference from DNA topology. Master's rotation
- Summer 2016: **Anant Preet**
Stochastic simulation of protein cluster composition probes. Bachelor's exchange program
- Summer 2013: **Yuma Nishizawa**
Mesenchymal stem cell - islet cell co-aggregation spheroids for immunoprotection of islets. Bachelor's project
- Winter 2010: **Youngeun Kim**
Lithographic patterning methods for studying cell rigidity sensing. Bachelor's thesis, went on to pursue PhD in DNA Nanotechnology at Northwestern U., currently postdoc at Harvard U.

Course Under Construction

- 2015-Present: **Physical Chemistry of Polymers**
IPython Notebook Tutorial Series. Coverage: Conformations, Solution Thermodynamics, Networks and Gels, Programmed Folding of DNA, Coarse-Grained Models in Python

Iwata Lab Tutorial:

- Fall 2013: **Intermolecular and Surface Forces**
Work through equations in Jacob Israelachvili's textbook on the subject. Weekly 1-2 hour sessions for 1 semester.

Teaching Assistant and Review Sessions Given During Undergraduate at University of Colorado:

- Spring 2009: **CHEM-3200 Chemical Engineering Fluid Mechanics**
Via Engineering Fellows - Thrice lead exam preparation sessions (1-2 hour).
- Fall 2008: **CHEM-2120 Chemical Engineering Material and Energy Balances**
Via Engineering Fellows - Thrice lead exam preparation sessions (1-2 hour).
- Fall 2008: **CHEM-4330 Chemical Engineering Reaction Kinetics**
Teaching Assistant

PEER-REVIEWED MANUSCRIPTS [Google Scholar]

* indicates corresponding author

12. I. T. Hoffecker, Y. Arima, H. Iwata, "Tuning intercellular adhesion with membrane-anchored oligonucleotides", *Journal Royal Society Interface - revision submitted* , (2019).
11. I. T. Hoffecker, Y. Yang, G. Bernardinelli, P. Orponen, B. Högberg, "A Computational Framework for DNA Sequencing-Based Microscopy", *Proc. Nat. Acad. Sci.* , (2019).
10. A. Shaw, I. T. Hoffecker, I. Smyrlaki, J. Rosa, A. Grevys, D. Bratlie, I. Sandlie, T. E. Michaelsen, J. T. Andersen, B. Högberg, "Binding to Nanopatterned Antigens is Dominated by the Spatial Tolerance of Antibodies", *Nature Nanotechnology* **14**, 184-190 (2019).
9. I. T. Hoffecker, S. Chen, A. Gâdin, A. I. Teixeira, B. Högberg, "Solution Controlled Conformational Switching of an Anchored Wireframe DNA Nanostructure", *Small* , 1803628 (2018).
8. J. F. Hoffecker, I. T. Hoffecker, "Technological complexity and the global dispersal of modern humans", *Journal of Archaeological Method and Theory* **25**, 202-225 (2018).
7. J. F. Hoffecker, I. T. Hoffecker, "The Structural and Functional Complexity of Hunter-Gatherer Technology", *Journal of Archaeological Method and Theory* , 1-24 (2017).
6. I. T. Hoffecker, N. Takemoto, Y. Arima, H. Iwata*, "Sequence-specific nuclease-mediated release of cells tethered by oligonucleotide phospholipids", *Biomaterials* **53**, 318-329 (2015).
5. S. Wong, W.H. Guo, I.T. Hoffecker, Y.L. Wang*, "Preparation of a micropatterned rigid-soft composite substrate for probing cellular rigidity sensing", *Methods Cell Biol.* **121**, 3-15 (2014).
4. I.T. Hoffecker, H. Iwata*, "Manipulation of cell sorting in mesenchymal stromal cell-islet cell co-aggregate spheroids", *Tissue Engineering Part A.* **20**, 1643-1653 (2014).
3. K. Sakurai, I.T. Hoffecker, H. Iwata*, "Long term culture of cells patterned on glass via membrane-tethered oligonucleotides", *Biomaterials* **34**, 361-370 (2013).
2. I.T. Hoffecker, W.H. Guo, Y.L. Wang*, "Assessing the spatial resolution of cellular rigidity sensing using a micropatterned hydrogel-photoresist composite", *Lab Chip* **11**, 3538-3544 (2011).
1. S.M. LaNasa, I.T. Hoffecker, S.J. Bryant*, "The role of pore size on the mechanical properties of porous poly(ethylene glycol) and poly(2-hydroxyethyl methacrylate) hydrogels", *Journal of Biomedical Materials Research - Part B: Applied Biomaterials* **96B**, 294-302 (2011).

OTHER PUBLICATIONS

- I.T. Hoffecker, G. Bernardinelli, L. Vornholz, Y. Yang, B. Högberg, "Reconstructing Nanoscale Structures from Sequence Topology of Spatial Networks of Barcoded DNA", *Biophys. J.* **114**, 692a-693a (2018).

- C. Ciappino, I.T. Hoffecker, “Advancing our understanding of biosurfaces”, *Materials Views*, Conference report for FEBS-ESF Biosurfaces conference (2013).

PRESENTATIONS

† *presenter*

15. StratRegen Seminar, *A Computational Framework for DNA Sequencing Based Microscopy*, Karolinska Institutet, Stockholm, February 20, 2019 I.T. Hoffecker†, B. Högberg
14. Biophysical Society 2018 Annual Meeting, *Reconstructing nanoscale structures from sequence topology of spatial networks of barcoded DNA*, San Francisco, CA, USA, February 13-17, 2018 I.T. Hoffecker†, G. Bernardinelli, L. Vornholz, Y. Yang, B. Högberg
13. 44th International Symposium on Nucleic Acids Chemistry, *DNA Nanotechnology and Next Gen Sequencing-Based Approach to Inferring Spatial Properties of Nanoscale Structures*, Tokyo University of Science, Tokyo, Japan, November 14-16, 2017 I.T. Hoffecker†, G. Bernardinelli, L. Vornholz, Y. Yang, B. Högberg
12. Membrane receptor organization and signal transduction - Biophysical Society, *Quantifying clusters of membrane proteins with spatially local DNA barcode amplification and next gen sequencing*, Stockholm Nobel Forum, Sweden, May 11, 2017 I.T. Hoffecker†, G. Bernardinelli, B. Högberg
11. Biophysical Society 2017 Annual Meeting, *Dissecting the mechanisms of complex multivalent antibody binding kinetics on antigen patterned DNA nanostructures*, New Orleans, LA, Feb 12-16, 2017 I.T. Hoffecker†, A. Shaw, B. Högberg
10. 1st Biomedical Young Researchers Symposium, *Quantitative control of artificial cell-cell doublet cohesion mediated by DNA-lipid inserts*, Karolinska Institutet, Stockholm, Sweden, October 21, 2016 I.T. Hoffecker†, Y. Arima, H. Iwata
9. Emerging Methods and Technologies for Medical Research Conference, *Quantitative control of artificial cell-cell doublet cohesion mediated by DNA-lipid inserts*, Karolinska Institutet, Stockholm, Sweden, September 2-3, 2015 I.T. Hoffecker†, Y. Arima, H. Iwata
8. Institute Network Symposium, *Quantitative control of artificial cell-cell doublet cohesion mediated by DNA-lipid inserts*, Kyoto University, Japan, December 2014 I.T. Hoffecker†, Y. Arima, H. Iwata
7. Nanomics Symposium, *Manipulating cell sorting in MSC/Islet multicellular spheroids*, Kyoto University, Japan, November 2013 I.T. Hoffecker†, H. Iwata
6. ESF-FEBS Workshop on Biological Surfaces and Interfaces (**Advanced Healthcare Materials Poster Award**), *Cell Lego*, Sant Feliu de Guixols, Spain, July 2013 I.T. Hoffecker†, H. Iwata
5. 12th Annual Meeting of the Japanese Society for Regenerative Medicine, *In vitro control of mouse co-BMSC-islet spheroid organization through ROCK inhibition*, Yokohama, March 2013 I.T. Hoffecker†, H. Iwata
4. Innovative approaches to understanding pancreatic beta-cell function (**Opening 50 minute lecture**), *Protecting pancreatic islets with immuno-privileged cell types: co-aggregation and manipulation of emergent organization*, Ritsumeikan University, Jan 2013 I.T. Hoffecker†, H. Iwata

3. Kyoto Institute for Polymer Science KIPS Annual Symposium, Poster Session (**Excellent Poster Award**), *Cell-on-glass patterns using membrane tethered DNA*, Kyoto, Dec. 2012 I.T. Hoffecker[†], K. Sakurai, H. Iwata
2. 5th International Symposium on Nanomedicine, *Pinch vs. Pull: The spatial resolution of cellular rigidity sensing*, Nagoya University, March 2012 I.T. Hoffecker[†], W.H. Guo, Y.L. Wang
1. Japan Biomaterial Society, Annual Symposium, *Micropatterning technique for measuring cellular rigidity detection limits*, Fukui University, December 2011 I.T. Hoffecker[†], W.H. Guo, Y.L. Wang

OTHER ACTIVITIES

- Stockholm Biological Computing Book Club/Study Group Organizer
- Referee for Royal Soc. Interface (2016)
- Member of Biophysical Society (2016-present)
- Member of the Japan Society for Regenerative Medicine