

# HEE-SUN HAN

Assistant Professor and Mark A. Pytosh Scholar  
Assistant Professor, Department of Chemistry, UIUC  
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## PROFESSIONAL EXPERIENCE

- 2017 – Present     **University of Illinois at Urbana-Champaign**, Urbana, IL  
*Assistant Professor and Mark A. Pytosh Scholar of Chemistry*  
*Faculty Affiliate at Carl R. Woese Institute of Genomic Biology*
- 2016 – 2017     **Harvard University**, Cambridge, MA  
*Research Associate in Physics/Applied Physics*  
Research advisor: Professor David A. Weitz
- 2013 – 2016     **Harvard University**, Cambridge, MA  
*Postdoctoral Associate in Physics/Applied Physics*  
Research advisor: Professor David A. Weitz
- 2012 – 2013     **Massachusetts Institute of Technology**, Cambridge, MA  
*Postdoctoral Fellow in Chemistry*  
Research advisor: Professor Mounji G. Bawendi

## EDUCATION

- 2006-2012     **Massachusetts Institute of Technology**, Cambridge, MA  
*Ph.D. in Physical Chemistry*  
Research Advisor: Professor Mounji G. Bawendi
- 2002 – 2006     **Seoul National University**, Seoul, Republic of Korea  
*B.A. in Physical Chemistry*
- 2003 – 2004     **Carnegie Mellon University**, Pittsburgh, PA  
*Visiting Student*

## DISTINCTIONS

- 2017 – Present     **Mark A. Pytosh Scholar**
- 2011     **Vivian A. and E. Emerson Morse Travel Grant**
- 2006-2011     **Samsung Scholar** for Ph.D. Study
- 2006-2012     **KFAS Scholar** for Ph.D. Study  
Korea Foundation for Advanced Studies (gratefully declined)
- 2006     **Valedictorian, Summa cum Laude**  
College of Natural Science, Seoul National University
- 2006     **Representative of Korea** in Lindau Nobel Laureate Meeting  
8<sup>th</sup> Meeting in Chemistry, Germany
- 2004-2006     **Scholarship for Outstanding Undergraduate Students**  
Korea Foundation for Advanced Studies
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2002-2006      **Scholarship for Academic Excellence**  
Seoul National University

## PUBLICATIONS

10. **Han H.-S.**; Cantalupo P. G.; Rotem A.; Cockrell S. K.; Carbonnaux M.; Pipas J. M.; Weitz D. A. "Whole-Genome Sequencing of a Single Viral Species from a Highly Heterogeneous Sample" **Angew. Chem. Int. Ed.** 2015, 54, 13985–13988.

\* Above article was selected as a "Hot paper".

9. **Han H.-S.**; Niemeyer E.; Huang Y.; Kamoun W. S.; Martin J. D.; Bhaumik J.; Chen Y.; Roberge S.; Cui J.; Martin M. R.; Fukumura D.; Jain R. K.; Bawendi M. G.; Duda D. G. "Quantum Dot/Antibody Conjugates for *In vivo* Cytometric Imaging in Mice" **Proc. Natl. Acad. Sci. U.S.A.** 2015, 112, 1350–1355.
8. Chen O.; Zhao J.; Chauhan V. P.; Cui J.; Wong C.; Harris D. K.; Wei H.; **Han H.-S.**; Fukumura D.; Jain R. K.; Bawendi M. G. "Compact High-Quality CdSe-CdS Core-Shell Nanocrystals with Narrow Emission Linewidths and Suppressed blinking" **Nat. Mater.** 2013, 12, 445–451.
7. Manfrinato V. R.; Wanger D.D.; Strasfeld D. B.; **Han H.-S.**; Marsili F.; Arrieta J. P.; Mentzel T. S.; Bawendi M. G.; Berggren K. K. "Controlled Placement of Colloidal Quantum Dots in sub-15-nm Clusters" **Nanotechnology** 2013, 24, 125302.
6. **Han H.-S.**; Martin J.; Lee J.; Harris D. K.; Fukumura D.; Jain R. K.; Bawendi M. G. "Spatial Charge Configuration Regulates Nanoparticle Transport and Binding Behavior *in vivo*" **Angew. Chem. Int. Ed.** 2013, 52, 1414–1419.

\* Above article was highlighted in **Nat. Mater.** 2013, 12, 91.

5. Wei H.; Insin N.; Lee J.; **Han H.-S.**; Cordero J. M.; Liu W.; Bawendi M. G. "Compact Zwitterion-Coated Iron Oxide Nanoparticles for Biological Applications" **Nano Lett.** 2012, 12, 22–25.
4. Harris D. K.; Allen P. M.; **Han H.-S.**; Walker B. J.; Lee J.; Bawendi M. G. "Synthesis of Cadmium Arsenide Quantum Dots Luminescent in the Infrared", **J. Am. Chem. Soc.** 2011, 133, 4676–4679.
3. Dorn A.; Strasfeld D. B.; Harris D. K.; **Han H.-S.**; Bawendi M. G. "Using Nanowires to Extract Excitons from a Nanocrystal Solid" **ACS Nano** 2011, 5, 9028–9033.
2. **Han H.-S.**; Devaraj N. K.; Lee J.; Hilderbrand S. A.; Weissleder R.; Bawendi M. G. "Development of a Bioorthogonal and Highly Efficient Conjugation Method for Quantum Dots using Tetrazine-Norbornene Cycloaddition" **J. Am. Chem. Soc.** 2010, 132, 7838–7839.
1. Verma A.; Uzun O.; Hu Y.; Hu Y.; **Han H.-S.**; Watson N.; Chen S.; Irvine D. J.; Stellacci F. "Surface-Structure-Regulated Cell-Membrane Penetration by Monolayer-Protected Nanoparticles" **Nat. Mater.** 2008, 7, 588–598.

## INVITED PRESENTATIONS

18. Seoul National University, Materials Science Engineering, "Nano- & micro-sized materials for novel studies in life sciences", Seoul, Korea, 05/2017.
17. Cornell University, Biological Engineering, "Towards a holistic understanding of intact, complex biological systems" Ithaca, NY, 03/2017.
16. Massachusetts Institute of Technology, Chemical Engineering, "Towards a holistic understanding of intact, complex biological systems", Cambridge, MA, 02/2017.
15. University of Pennsylvania, Materials Science and Engineering, "Towards a holistic understanding of intact, complex biological systems", Philadelphia, PA, 02/2017.
14. Georgia Institute of Technology, Chemical & Biomolecular Engineering, "Towards a holistic understanding of intact, complex biological systems", Atlanta, GA, 02/2017.

13. University of Illinois, Urbana-Champaign, Chemistry, "Towards a holistic understanding of intact, complex biological systems" Urbana, IL, 01/2016.
12. University of Maryland, College Park, Chemistry & Biochemistry, "Towards a holistic understanding of intact, complex biological systems", College Park, MD, 01/2017.
11. University of Minnesota, Twin cities, Chemistry, "Towards a holistic understanding of intact, complex biological systems", Minneapolis, MN, 12/2016.
10. University of California, Santa Barbara, Chemistry & Biochemistry, "Towards a holistic understanding of intact, complex biological systems", Santa Barbara, CA 11/2016.
9. POSTECH, Life Science, "Understanding living tissues at their cellular level" Pohang, Korea, 8/2016.
8. Seoul National University, Biological Sciences, "Functional Analysis of Cell *in vivo* at single cell resolution" Seoul, Korea, 8/2016.
7. KAIST, Medical Science and Engineering, "Functional Analysis of Cell *in vivo* at single cell resolution" Daejeon, Korea, 8/2016.
6. Korea University, Institute for Basic Science, Center for Molecular Spectroscopy and Dynamics, "New platforms for imaging and sequencing single cells" Seoul, Korea, 8/2016.
5. Seoul National University, Chemistry, "Nano- and micro-technology to study single cells in their native environments" Seoul, Korea, 5/2015
4. Seoul National University, Chemistry, "Synthesis of QDs and their conjugates for *in vitro* and *in vivo* imaging applications" Seoul, Korea, 4/2013.
3. KAIST, Nanoscience and Technology, "Novel quantum dot conjugates for *in vitro* and *in vivo* imaging applications" Daejeon, Korea, 4/2013.
2. POSTECH, Chemistry, "Development of fluorescent semi-conductor nanocrystal conjugates for *in vitro* and *in vivo* imaging applications" Pohang, Korea, 4/2013.
1. Yonsei University, Institute for Basic Science, Center for Nanomedicine, "Synthesis of QDs and their conjugates for *in vitro* and *in vivo* imaging applications" Seoul, Korea, 4/2013.

## CONTRIBUTED PRESENTATIONS

7. Materials Research Society Spring Meeting "De novo sequencing of novel viral genomes using droplet microfluidics" San Francisco, CA, 4/2014.
6. Materials Research Society Fall Meeting "Spatial charge configuration regulates nanoparticle transport and binding behavior *in vivo*" Boston, MA, 11/2012.
5. Materials Research Society Fall Meeting "Development of quantum dot antibody conjugates for *in vivo* imaging of single endogenous cells" Boston, MA, 11/2011.
4. Gordon Research Conference: Clusters, Nanocrystals & Nanostructures "Synthesis of compact, biocompatible quantum dots with a zwitterionic polymer coating" South Hadley, MA, 7/2011.
3. Gordon Research Conference: Cancer Nanotechnology "Multiplexed cytometric immunomaging of hematopoietic stem cells using QD-Ab conjugates" Waterville, ME, 7/2011.
2. American Chemical Society National Meeting "Bioorthogonal and highly efficient conjugation method for QDs using tetrazine-norbornene cycloaddition" San Francisco, CA, 3/2010.
1. Gordon Research Conference: Single Molecule Approaches to Biology "Development of efficient conjugation methods on quantum dots using tetrazine-norbornene cycloaddition" Lucca, Italy, 6/2010.

## PATENTS

4. **Han H.-S.**, Pipas, J.M. and Weitz D.A. "Systems and Methods for Sequencing Viruses" Provisionally submitted.
3. **Han H.-S.**, Wei H., Insin N. and Bawendi M. G. "Compact Nanoparticles for Biological Applications" W.O. Patent #2013090601, Aug. 8, 2013/U.S. #20130184444, July 18, 2013.
2. **Han H.-S.**, Devaraj N. K., Hilderbrand S. A., Weissleder R. and Bawendi M. G. "Compositions and Methods for Bioconjugation to Quantum Dots" W.O. Patent #2011112970, Jan. 19, 2012.
1. **Han H.-S.**, Liu W. and Bawendi M. G. "Ligands for Semiconductor Nanocrystals" W.O. Patent #2011119654, Publication date: Sep. 29, 2011/U.S. #20110236315, Sep. 29, 2011.

## TEACHING AND SERVICES

- Fall 2017            **Instructor.** CHEM 520: Advanced analytical chemistry  
University of Illinois at Urbana-Champaign, Department of Chemistry
- 2014-2016           **Postdoctoral Mentor.** Mentored two undergraduate students and one high school student in the development of drop microfluidic chips for single cell/virus assays during the summer
- 2012-2014           **Postdoctoral Mentor.** Mentored two graduate students in quantum dot (QD) and QD ligand development for bioimaging applications of QDs
- 2009-2014           **Graduate Student Mentor.** Mentored three graduate students in QD and QD ligand development
- Fall 2006            **Teaching Assistant.** CHEM 5.03: Principles of Chemical Science  
Massachusetts Institute of Technology, Department of Chemistry