

SANGJIN KIM

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RESEARCH INTERESTS

Single molecule biophysics, single cell microbiology, systems biology, computational biology.
Gene expression, DNA mechanics, DNA allostery, evolution, antibiotic resistance.

ACADEMIC HISTORY

University of Illinois at Urbana-Champaign, Urbana, IL
Assistant Professor, Department of Physics 2019-present
Member - NSF Center for the Physics of Living Cells, UIUC
Faculty affiliate - Biocomplexity theme, Institute for Genomic Biology, UIUC

Yale University, Howard Hughes Medical Institute, New Haven, CT
Associated Research Scientist 2016-2018
Postdoctoral Fellow 2010-2016
Research advisor: Dr. Christine Jacobs-Wagner

Harvard University, Cambridge, MA
Ph.D. in Chemistry, 2010
Thesis title: Single-molecule studies of DNA polymerization and DNA-protein interactions
Thesis advisor: Dr. X. Sunney Xie

Seoul National University, Seoul, South Korea
B.S. in Chemistry, *summa cum laude*, 2004

PUBLICATIONS

PEER REVIEWED PAPERS

* denotes co-first authorship and ** denotes co-corresponding authorship.

S. Kim**, B. Beltran, I. Irnov and C. Jacobs-Wagner**, "Long-distance cooperative and antagonistic RNA polymerase dynamics via DNA supercoiling," *Cell*, 179, 106-119 (2019).

W.T. Gray, S.K. Govers, Y. Xiang, B.R. Parry, M. Campos, **S. Kim**, and C. Jacobs-Wagner, "Nucleoid size scaling and intracellular organization of translation across bacteria," *Cell*, 177, 1632-1648 (2019).

S. Kim and C. Jacobs-Wagner, "Effects of mRNA degradation and site-specific transcriptional pausing on protein expression noise," *Biophysical Journal*, 114, 1718-1729 (2018).

S. Kim*, E. Bromströmer*, D. Xing*, J. Jin*, S. Chong, H. Ge, S. Wang, C. Gu, L. Yang, Y.Q. Gao, X.-D. Su, Y. Sun, and X.S. Xie, "Probing allostery through DNA," *Science*, 339, 816-819 (2013).

- Featured in a Perspective article, "Fine tuning gene regulation," *Science*, 339, 766-767 (2013)
- Featured in Research Highlights, "Appreciating allostery," *Nature Chemistry*, 5, 251 (2013)
- Featured in News and Views, "Allostery through DNA," *Nature Structural and Molecular Biology*, 30, 410 (2013)
- Recommended in f1000 (f1000.com/717980343)

S. Kim, C.M. Schroeder, and X.S. Xie, "Single-molecule study of DNA polymerization activity of HIV-1 reverse transcriptase on DNA templates," *Journal of Molecular Biology*, 395, 995-1006 (2010).

S. Kim, P.C. Blainey, C.M. Schroeder, and X.S. Xie, "Multiplexed single-molecule assay for enzymatic activity on flow-stretched DNA," *Nature Methods*, 4, 397-399 (2007).

J. Lee, S. Ryu, J. Chang, **S. Kim**, and S.K. Kim, "Direct observation of an intermediate state for a surface photochemical reaction initiated by hot electron transfer," *Journal of Physical Chemistry B*, 109, 14481-14485 (2005).

BOOK CHAPTER

C.M. Schroeder, P.C. Blainey, **S. Kim**, and X.S. Xie, "Hydrodynamic flow-stretched assay for single-molecule studies of nucleic acid-protein interactions" in *Single Molecule Techniques A Laboratory Manual*, P.R. Selvin and T. Ha (eds), Cold Spring Harbor Laboratory Press, 2008.

CONFERENCE ABSTRACT

S. Kim, M. Mlodzianoski, J. Bewersdorf, and C. Jacobs-Wagner, "Probing spatial organization of mRNA in bacterial cells using 3D super-resolution microscopy," *Biophysical Journal*, 102, 278a (2012)

SELECTED PRESENTATIONS

S. Kim (speaker), "Long-distance cooperative and antagonistic RNA polymerase dynamics via DNA supercoiling," Department of Biochemistry, University of Illinois at Urbana-Champaign, IL, September, 2019.

S. Kim (speaker), "Emergent group behavior when single becomes multiple," Center for Physics of Living Cells, University of Illinois at Urbana-Champaign, IL, January, 2019.

S. Kim (speaker), "Collaborative and antagonistic group behaviors of RNA polymerases," Department of Molecular, Cellular and Developmental Biology, Yale University, CT, September, 2018.

S. Kim (speaker) and C. Jacobs-Wagner, "Effects of mRNA degradation and site-specific transcriptional pausing on protein expression noise," Molecular Genetics of Bacteria and Phages, Madison, WI, August, 2018.

S. Kim (speaker), "When traffic matters in gene regulation: insights from in vivo and in silico studies," Department of Physics, University of Illinois at Urbana-Champaign, IL, February, 2018.

S. Kim (speaker) and C. Jacobs-Wagner, "Combinatorial origin of protein expression noise," 62nd Biophysical Society Annual Meeting, San Francisco, CA, February, 2018.

S. Kim (speaker) and C. Jacobs-Wagner, "Probing temporal dynamics of gene expression in *E. coli*," FASEB meeting on Mechanisms and Regulation of Prokaryotic Transcription, Saxtons River, VT, June 2015.

S. Kim (speaker) and C. Jacobs-Wagner, "Probing temporal dynamics of transcription and mRNA degradation in *E. coli*," American Society for Cell Biology Annual Meeting, Philadelphia, PA, December, 2014.

S. Kim (speaker), M. Mlodzianoski, J. Bewersdorf, and Christine Jacobs-Wagner, "Probing spatial organization of mRNA in bacterial cells using 3D super-resolution microscopy," 56th Biophysical Society Annual Meeting, San Diego, CA, February, 2012.

S. Kim, E. Bromströmer, and X.S. Xie, “Single-molecule studies of DNA allostery” (poster), Gordon Research Conference in Single Molecule Approaches to Biology, Barga, Italy, June 2010.

S. Kim (speaker), C.M. Schroeder, and X.S. Xie, “Single-molecule study of HIV-1 reverse transcriptase DNA polymerization dynamics on a flow-stretched DNA,” FASEB meeting on Nucleic Acid Enzymes, Saxtons River, VT, June 2008.

TEACHING

Course teaching

University of Illinois at Urbana-Champaign

Lab Coordinator and Lab Instructor, Electricity and Magnetism (Physics 212) 2019

Harvard University

Teaching Assistant, General Chemistry and Physical Chemistry Lab 2005

Outreach education

NSF Center for Physics of Living Cells Summer School, UIUC 2019

A one-week long program offering hands-on training on the most recent single-molecule research for graduate students and postdoctoral researchers from universities around the world.

Developed and led a new course “Bacterial Gene Expression in Space, Time and Numbers” together with Dr. Ido Golding.

Mentoring

Harvard University, Yale University, and UIUC 2007-

Mentored eleven undergraduate and graduate students in the laboratory setting.

OTHER SERVICE

Preliminary Exam Committee for three graduate students in biological physics, UIUC 2019

Platform Chair, Biophysical Society 62nd Annual Meeting 2018

Student and postdoc committee for faculty search in MCDB, Yale University 2015, 2017

Ad hoc reviewer in *Nature Structural and Molecular Biology*, *Journal of the American Chemical Society*, and *Cell* 2007-

HONORS AND AWARDS

Best poster award, MCDB, Yale University 2015

Travel grant at the 56th Biophysical Society Annual Meeting 2012

Christensen Prize for Outstanding Research Achievement, CCB, Harvard University 2010

Graduate fellowship, Korea Foundation for Advanced Studies 2004-2009

Samsung Lee Kun Hee Scholarship, Samsung Foundation of Culture, declined 2004

Presidential award for young leaders, Ministry of Education, South Korea 2004

Outstanding student award, Chemistry Alumni Association, Seoul National University 2003, 2004

Undergraduate fellowship, Korea Foundation for Advanced Studies 2002-2004

Full scholarship for academic excellence, Seoul National University 2001-2004