

# Nan Hao

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## Education

Ph.D. in Biochemistry and Biophysics, 2006  
University of North Carolina at Chapel Hill, Chapel Hill, NC, United States

B.S. in Biochemistry and Molecular Biology, 2001  
Peking University, P.R.China

## Positions Held

07/2018-present  
Associate Professor, Molecular Biology  
University of California San Diego, La Jolla, CA, United States

07/2013-06/2018  
Assistant Professor, Molecular Biology  
University of California San Diego, La Jolla, CA, United States

09/2008-06/2013  
Research Associate, Systems Biology  
Harvard University/Howard Hughes Medical Institute, Cambridge, MA, United States

09/2006-08/2008  
Postdoctoral Research Associate, Computational Biology  
University of North Carolina at Chapel Hill, Chapel Hill, NC, United States

## Publications (2014 – present; from UCSD)

Yang Li, Julie Roberts, Zohreh AkhavanAghdam, **Nan Hao** (2017) Mitogen-activated protein kinase (MAPK) dynamics determine cell fate in the yeast mating response. *The Journal of Biological Chemistry* 292(50):20354-20361.

Yang Li, Meng Jin, Richard O’Laughlin, Philip Bittihn, Lev S Tsimring, Lorraine Pillus, Jeff Hasty, **Nan Hao** (2017) Multigenerational silencing dynamics control cell aging. *Proceedings of the National Academy of Sciences of the USA*. 114 (42): 11253-11258.

Bin Shao, Haiyu Yuan, Rongfei Zhang, Xuan Wang, Shuwen Zhang, Qi Ouyang, **Nan Hao\***, Chunxiong Luo\* (2017) Reconstructing the regulatory circuit of cell fate determination in yeast mating response. *PLoS Computational Biology* 13(7): e1005671. (\* co-corresponding authors)

Yanfei Jiang, Zohreh AkhavanAghdam, Lev S. Tsimring, **Nan Hao** (2017) Coupled feedback loops control the stimulus-dependent dynamics of the yeast transcription factor Msn2. *The Journal of Biological Chemistry* 292(30): 12366-12372.

Rongfei Zhang, Haiyu Yuan, Shujing Wang, Qi Ouyang, Yong Chen, **Nan Hao**, Chunxiong Luo (2017) High-throughput single-cell analysis for the proteomic dynamics study of the yeast osmotic stress response. *Scientific Reports* 7:42200

Zohreh AkhavanAghdam, Joydeb Sinha, Omar P. Tabbaa, **Nan Hao** (2016) Dynamic control of gene regulatory logic by seemingly redundant transcription factors. *Elife* 5. pii: e18458.

Haiyu Yuan, Rongfei Zhang, Bin Shao, Xuan Wang, Qi Ouyang, **Nan Hao**, Chunxiong Luo (2016) Protein expression patterns of the yeast mating response. *Integrative Biology* 8(6): 712-9.

Anders S. Hansen, **Nan Hao**, Erin K. O'Shea (2015) High-throughput microfluidics to control and measure signaling dynamics in single yeast cells. *Nature Protocols* 10(8):1181-97.

### **Publications (2013 and before)**

**Nan Hao**, Bogdan Budnik, Jeremy Gunawardena, Erin K. O'Shea (2013) Tunable signal processing through modular control of transcription factor translocation. *Science* 339(6118): 460-4.

**Nan Hao**, Necmettin Yildirim, Michal J. Nagiec, Stephen Parnell, Beverly Errede, Henrik G. Dohlman, Timothy C. Elston (2012) Combined computational and experimental analysis reveals MAP kinase-mediated feedback phosphorylation as a mechanism for signaling specificity. *Molecular Biology of the Cell* 23(19): 3899-910.

**Nan Hao**, Erin K. O'Shea (2012) Signal-dependent dynamics of transcription factor translocation controls gene expression. *Nature Structural & Molecular Biology* 19(1): 31-9.

**Nan Hao**, Yaxue Zeng, Timothy C. Elston, Henrik G. Dohlman (2008) Control of MAP kinase signaling specificity by feedback phosphorylation of a shared adaptor protein Ste50. *The Journal of Biological Chemistry* 283(49): 33798-802.

Marcelo Behar, **Nan Hao**, Henrik G. Dohlman, Timothy C. Elston (2008) Dose-to-duration encoding and signaling beyond saturation in intracellular signaling networks. *PLoS Computational Biology* 4(10): e1000197

**Nan Hao**, Sujata Nayak, Marcelo Behar, Ryan Shanks, Michal Nagiec, Beverly Errede, Jeffrey Hasty, Timothy C. Elston, Henrik G. Dohlman (2008) Regulation of cell signaling dynamics by the protein kinase-scaffold Ste5. *Molecular Cell* 30(5): 649-656.

Marcelo Behar, **Nan Hao**, Henrik G. Dohlman, Timothy C. Elston (2007) Mathematical and computational analysis of adaptation via feedback inhibition in signal transduction pathways. *Biophysical Journal* 93(3): 806-21.

**Nan Hao**, Marcelo Behar, Timothy C. Elston, Henrik G. Dohlman (2007) Systems biology analysis of G protein and MAP kinase signaling in yeast. *Oncogene* 26(22): 3254-66.

**Nan Hao**, Marcelo Behar, Stephen C. Parnell, Matthew P. Torres, Christoph H. Borchers, Timothy C. Elston, Henrik G. Dohlman (2007) A systems-biology analysis of feedback inhibition in the Sho1 osmotic-stress response pathway. *Current Biology* 17(8): 659-67.

Scott A. Chasse, Paul Flanary, Stephen C. Parnell, **Nan Hao**, Jiyoung Y. Cha, David P. Siderovski, Henrik G. Dohlman (2006) Genome-scale analysis reveals Sst2 as the principal regulator of mating pheromone signaling in the yeast *Saccharomyces cerevisiae*. *Eukaryotic Cell* 5(2): 330-46.

Xiao Wang, **Nan Hao**, Henrik G. Dohlman, Timothy C. Elston (2006) Bistability, stochasticity, and oscillations in the mitogen-activated protein kinase cascade. *Biophysical Journal* 90(6): 1961-78.

Necmettin Yildirim, **Nan Hao**, Henrik G. Dohlman, Timothy C. Elston (2004) Mathematical modeling of RGS and G-protein regulation in yeast. *Methods in Enzymology* 389: 383-98.

**Nan Hao**, Necmettin Yildirim, Yuqi Wang, Timothy C. Elston, Henrik G. Dohlman (2003) Regulators of G protein signaling and transient activation of signaling: experimental and computational analysis reveals negative and positive feedback controls on G protein activity. *The Journal of Biological Chemistry* 278(47): 46506-15.

## **Funding**

### **Active**

NIH R01 GM111458 (08/15/14 – 05/31/19)

A quantitative analysis of dynamic signal processing by transcription factors

Role: PI

NSF MCB-1616127 (08/15/16 – 07/30/20)

Engineered control of cellular aging

Role: PI

NIH R01 AG056440 (08/01/17 – 05/31/22)

Network-driven dynamics of replicative aging

Role: Contact PI

NIH P50 GM085764 (09/01/15 – 05/31/19)

Center for Systems Biology of Cellular Stress Responses

Role: Co-Investigator

### **Completed**

UCSD Frontiers of Innovation Scholars Program (03/01/16 – 09/30/16)

Reverse engineering of microbial mediation of host tolerance to infection

Role: PI

## **Honors and Awards**

2017-present Member, The American Society for Biochemistry and Molecular Biology

2013-present Member, The American Association for the Advancement of Science

2013-present Member, Genetics Society of America

2007-present Full Member, Sigma Xi, The Scientific Research Society

2004-2006 Pre-doctoral Fellowship, American Heart Association

2001 Excellence Fellowship, University of North Carolina at Chapel Hill

## Professional Presentations

- 2018 San Diego Chromatin Club Seminar Series, San Diego, CA (Invited seminar)
- 2018 The 6<sup>th</sup> Annual Winter q-bio Meeting, Hawaii (Plenary talk)
- 2017 Interdisciplinary Research Center on Biology and Chemistry, Chinese Academy of Sciences, Shanghai, China (Invited seminar)
- 2017 Life Sciences and Biotechnology, Shanghai JiaoTong University, Shanghai, China (Invited seminar)
- 2017 Biomedical Engineering, Shanghai JiaoTong University, Shanghai, China (Invited talk)
- 2017 The 16<sup>th</sup> Society of Chinese Bioscientists in America (SCBA) Symposium, Hangzhou, China (Invited talk)
- 2017 Bioengineering, Duke University, Durham, NC (Invited seminar)
- 2017 UNC Biochemistry and Biophysics Retreat, Chapel Hill, NC (Keynote speaker)
- 2017 Experimental Biology Annual Meeting, Chicago (Invited talk)
- 2017 The 5<sup>th</sup> Annual Winter q-bio Meeting, Hawaii (Plenary talk)
- 2017 The 7<sup>th</sup> Annual Southern California Regional Conference on Systems Biology, Irvine, CA (Invited talk)
- 2016 The Synthetic Biology Young Scholar Forum, Beijing, China (Invited talk)
- 2015 The ninth q-bio Summer School, San Diego, CA (Invited lecture)
- 2014 Center for Synthetic & Systems Biology, Tsinghua University, Beijing, China (Invited seminar)
- 2014 International Young Scholars Systems and Synthetic Biology Symposium, Beijing, China (Invited talk)
- 2014 The eighth q-bio Summer School, San Diego, CA (Invited lecture)
- 2014 The second Annual Winter q-bio Meeting, Hawaii (Invited talk)
- 2014 BioCircuits Institute, UCSD (Invited seminar)
- 2013 The seventh q-bio Summer School, San Diego, CA (Invited lecture)
- 2013 Biological Sciences, University of California San Diego, La Jolla, CA (Invited seminar)
- 2013 Biophysics, University of Michigan, Ann Arbor, MI (Invited seminar)
- 2013 Bioengineering, University of Washington, Seattle, WA (Invited seminar)
- 2013 Biology, University of Iowa, Iowa City, IA (Invited seminar)
- 2013 Cell Biology, University of Texas Southwestern Medical Center, Dallas, TX (seminar)
- 2013 Systems Biology, University of Massachusetts Medical School, Worcester, MA (seminar)
- 2013 Biotechnology Institute, University of Minnesota - Twin Cities, Minneapolis, MN (Invited seminar)
- 2013 Genetics, Development and Cell Biology, Iowa State University, Ames, Iowa (seminar)
- 2012 Stadtman Symposium, National Institutes of Health, Bethesda, MD (Invited talk)
- 2012 Howard Hughes Medical Institute Science Meeting, Chevy Chase, MD (Poster)
- 2011 International Conference on Systems Biology of Human Disease, Boston, MA (Poster)
- 2011 Department of Chemistry & Chemical Biology, Harvard University, Cambridge, MA (invited seminar)
- 2008 Systems Biology of MAPK pathways workshop, Okinawa, Japan (Talk)
- 2007 Deconstructing Biochemical Networks, Montreal, Canada (Poster)
- 2007 Gordon Research Conference: Phosphorylation and G protein Mediated Signaling Networks, University of New England, Biddeford, ME (Poster)

2007 American Society for Biochemistry and Molecular Biology (ASBMB)/ Experimental Biology 2007 Annual Meeting, Washington DC (Talk)

### **Professional Service**

2014-present Editorial Board: Journal of Metabolomics & Systems Biology

Acting as a manuscript reviewer for the following journals:

*Science, eLife, Nature Communications, Cell Systems, Science Signaling, The Journal of Biological Chemistry, Biophysical Journal, ACS Synthetic Biology, PLoS Computational Biology, IET Systems Biology, Journal of Bioscience and Bioengineering, Gene Regulation and Systems Biology, Protein Science, WIREs Systems Biology and Medicine, Biotechnology Journal*