

## Curriculum Vitae

Lianhong Sun, Professor  
School of Life Sciences  
University of Science and Technology of China  
Hefei, Anhui, 230027, China

Phone: 551-3600529  
Fax: 551-3601443  
Email: lianhong@ustc.edu.cn

### Research Interest

Protein Engineering, Metabolic Engineering, and Synthetic Biology

### Education

Ph. D., Chemistry 1997 – 2002  
California Institute of Technology  
Pasadena, CA  
Advisor: Professor Frances H. Arnold  
Thesis Title: *Engineering Galactose Oxidase to Increase Expression Levels in E. coli, Enhance Thermostability and Introduce Novel Activities*

M.S., Physical Chemistry 1994 – 1997  
Dalian Institute of Chemical Physics, Chinese Academy of Sciences  
Dalian, Liaoning, P. R. China  
Advisor: Professor Xuechu Li  
Thesis Title: *Energy Transfer Reactions between  $NO(X^2\Pi, v''=0)$  and  $CO(a^3\Pi, v')$  with Various Vibrational Populations*

B.S., Chemistry 1990 – 1994  
Inner Mongolia University  
Hohhot, Inner Mongolia, P. R. China

### Professional Experience

Professor 2011 – date  
School of Life Sciences  
University of Science and Technology of China  
Hefei, Anhui

Assistant Professor 2004 – 2011  
Department of Chemical Engineering  
University of Massachusetts  
Amherst, MA

Postdoctoral Researcher 2002 – 2004  
Department of Chemical Engineering

Lawrence Berkeley National Laboratory  
University of California at Berkeley  
Berkeley, CA

Advisor: Professor Jay D. Keasling

Project: *Metabolomics of Desulfovibrio vulguris*

## Professional Memberships

American Chemical Society (ACS)

American Institute of Chemical Engineers (AIChE)

Society for Biomolecular Engineering (SBE)

## Awards

NSF CAREER Award (2008)

## Publications

### Journal Articles

1. Xu, Y., Yan, Y., Seeman, D., Sun, L., and Dubin, P. L. *Multimerization and Aggregation of Native State Insulin: Effect of Zinc*, **Langmuir**, DOI: 10.1021/la202902a
2. Chen, K., Xu, Y., Miranda, O. R., Dubin, P. L., Rotello, V., Sun, L., Guo, X. *Electrostatic Selectivity in Protein-nanoparticle Interactions*, **Biomacromolecules**, 12, 2552-2561, 2011..
3. Xu, Y., Mazzawi, M, Chen, K., Sun, L. and Dubin, P. L. *Protein Purification by Polyelectrolyte Coacervation: Influence of Protein Charge Anisotropy on Selectivity*, **Biomacromolecules**, 12, 1512-1522, 2011.
4. Sayut, D. J. and Sun, L. *Creating Designer Laccase*, **Chemistry & Biology**, 17, 918-920, 2010.
5. Sayut, D. J. and Sun, L. *Slow Activator Degradation Reduces the Robustness of a Coupled Feedback Loop Oscillator*, **Molecular BioSystems**, 6, 1469–1474, 2010.
6. Kambam, P. K. R., Eriksen, D., Lajoie, J., Sayut, D. J. and Sun, L. *Altering the Substrate Specificity of RhII by Directed Evolution*, **ChemBioChem**, 10, 553-558, 2009.
7. Sayut, D. J., Niu, Y. and Sun, L. *Construction and Enhancement of a Minimal Genetic AND Gate*, **Applied and Environmental Microbiology**, 75, 637-642, 2009
8. Sayut, D. J., Kambam, P. K. R. and Sun, L. *Enzyme Replacement Therapy for Lysosomal Storage Disorders. Recent Patents on Biomedical Engineering*, 1, 141-147, 2008 (Invited Review).
9. Cirino, P. C. and Sun, L. *Advancing Biocatalysis through Enzyme, Cellular, and Platform Engineering*, **Biotechnology Progress**, 24, 515-519, 2008 (Meeting Review).
10. Kambam, P., Sayut, D. J., Niu, Y., Eriksen, D. T., and Sun, L. *Directed Evolution of LuxI for Enhanced OHHL Production*, **Biotechnology and Bioengineering**, 101, 263-272, 2008.
11. Kambam, P., Henson, M. A., and Sun, L. *Design and Mathematical Modeling of a Synthetic Symbiotic Ecosystem*, **IET Systems Biology**, 2, 33-38, 2008. (The 16<sup>th</sup> most downloaded paper for the Journal in 2008.)
12. Sayut, D. J., Kambam, P., and Sun, L. *Noise and Kinetics of LuxR Positive Feedback Loops*, **Biochemical and Biophysical Research Communications**, 363, 667-673, 2007.

13. Sayut, D. J., Kambam, P., and Sun, L. *Engineering and Applications of Genetic Circuits*, **Molecular BioSystems**, 3, 835-840, 2007 (Invited Review).
14. Sayut, D. J., Yan, N., and Sun, L. *Construction and Engineering of Positive Feedback Loops*, **ACS Chemical Biology**, 1, 692-696, 2006 (Highlighted by **ACS Chemical Biology**).
15. Sun, L., Bulter, T., Alcalde, M., Petrounia, I. P., and Arnold, F. H., *Modification of Galactose Oxidase to Introduce Glucose 6-Oxidase Activity*, **ChemBioChem**, 3, 781-783, 2002.
16. Sun, L., Petrounia, I. P., Yagasaki, M., Bandara, G., and Arnold, F. H. *Expression and Stabilization of Galactose Oxidase in Escherichia coli by Directed Evolution*, **Protein Engineering**, 14, 699-704, 2001.

### Book Chapters

1. Sayut, D. J., Herrick, W. G. and Sun L. *Applications of Bacterial Quorum-Sensing Systems in Synthetic Biology*. In **Synthetic & Integrative Biology: Parasts & Systems, Design Theory & Applications**, 2011, 61-76, (Gevona, J. T. Ed), Nova Scientific Publisher, Inc. Hauppauge, NY.
2. Sayut, D. J., Niu, Y. and Sun, L. *Engineering the Logical Properties of a Genetic AND Gate*. In **Methods in Molecular Biology**, 2011, 743, 175-184, Nanoscale Biocatalysis: Methods and Protocols. (Wang, P. Ed), Humanna Press Inc. Totowa, NJ.
3. Sayut, D. J., Kambam, P. K. R., Herrick, W. G. and Sun, L. *Enzyme Production in Escherichia coli*. In **Manual of Industrial Microbiology and Biotechnology** (3<sup>rd</sup> edition), (Baltz, R. H., Davies, J. E., and Demain, A. L. Eds), ASM Press, Washington, DC.
4. Sun, L. and Yagasaki, M. *Screen for Oxidase by Detection of Hydrogen Peroxide with Horseradish Peroxidase*. In **Methods in Molecular Biology**, 230, 177-182, 2003. Directed Enzyme Evolution: Screening and Selection Methods. (Arnold, F. H. and Georgiou, G. Eds), Humanna Press Inc. Totowa, NJ.
5. Salazer, O. and Sun, L. *Evaluating a Screen and Analysis of Mutant Libraries*. In **Methods in Molecular Biology**, 230, 85-98, 2003. Directed Enzyme Evolution: Screening and Selection Methods. (Arnold, F. H. and Georgiou, G. Eds), Humanna Press Inc. Totowa, NJ.
6. Georgescu, R., Bandara, G. and Sun, L. *Saturation Mutagenesis*. In **Methods in Molecular Biology**, 230, 75-84, 2003. Directed Evolution: Library Creation. (Arnold, F. H. and Georgiou, G. Eds.), Humana Press Inc., Totowa, NJ.

### Patents

1. Arnold, F. H., Petrounia, I. P. and Sun, L. *Directed Evolution of Oxidase Enzymes*. **USA Patent No. US7098010B1**
2. Arnold, F. H., Petrounia, I. P. and Sun, L. *Directed Evolution of Galactose Oxidase*. **USA Patent No. US7115403B1**
3. Arnold, F. H., Sun, L. and Petrounia, I. P. *Novel Glucose 6-Oxidase*. **USA Patent No. US7220563**

### Oral and Poster Conference Presentations

1. Herrick, W. G., Kambam, P., Sayut, D. J., Niu, Y., and Sun, L. *Tunable and Autoinducible Gene Transcription for Production of Recombinant Proteins*, **Gordon Research Conferences on Biocatalysis**, Smithfield, RI, July 11-16, 2010.

2. Sayut, D. J., Kambam, P.K.R. and Sun, L. *Applications of Engineered LuxI-LuxR Quorum Sensing System*, **ACS Annual Meeting**, Washington, DC, August 16-20, 2009.
3. Sun, L. *Engineering and Applications of Quorum Sensing*, **Biochemical Engineering XVI**, Burlington, VT, July 5-9, 2009.
4. Sayut, D. J., Yan, N., and Sun, L. *Improvement of a Minimal Genetic and Gate Using Mutant Libraries of the LuxR Transcriptional Activator*, **International Conference on Biomolecular Engineering**, Santa Barbara, CA, January 18-21, 2009.
5. Sun, L. *Engineering and Application of Quorum Sensing*, **International Conference on Biomolecular Engineering**, Santa Barbara, CA, January 18-21, 2009.
6. Sayut, D. J. and Sun, L. *Improvement of Artificial Genetic Circuits Using Mutant Libraries of the LuxR Transcriptional Activator*, **AIChE Annual Meeting**, Philadelphia, PA, November 16-21, 2008.
7. Kambam, P. and Sun, L. *Directed evolution of RhII for introducing a novel activity*, **AIChE Annual Meeting**, Philadelphia, PA, November 16-21, 2008.
8. Kambam, P. and Sun, L. *Introduce a novel activity into the RhII enzyme by directed evolution*, **ACS Annual Meeting**, Philadelphia, PA, August 16-21, 2008.
9. Kambam, P., Sayut, D. J., and Sun, L. *Overproduction of OHL in E. coli via Directed Evolution and Metabolic Engineering*, **AIChE Annual Meeting**, Salt Lake City, UT, November 4-9, 2007.
10. Sayut, D. J. and Sun, L. *Properties of Engineered Quorum-Sensing Networks Incorporating Positive Feedback*, **AIChE Annual Meeting**, Salt Lake City, UT, November 4-9, 2007.
11. Kambam, P. and Sun, L. *Directed Evolution of LuxI for Improved OHL Production*, **ACS Annual Meeting**, Boston, MA, August 19-27, 2007.
12. Sayut, D. J., and Sun, L. *Construction and Engineering of Positive Feedback Loops*, **International Conference on Biomolecular Engineering**, San Diego, CA, January 15-18, 2006.
13. Sayut, D. J. and Sun, L. *Directed Evolution of the LuxR Transcription Factor for Applications in Synthetic Biology*, **AIChE Annual Meeting**, San Francisco, CA, November 12-17, 2006.
14. Kambam, P., Henson, M. A., and Lianhong Sun, *Design And Mathematical Modeling of a Quorum Sensing Based Synthetic Ecosystem with Applications to Competitive Mixed Cultures*, **ICE Annual Meeting**, Amherst, MA, May 4, 2006.
15. Sun, L. and Henson, M. A. *Development of a Molecular and Systems Biotechnology Course*, **AIChE Annual Meeting**, Cincinnati, OH, October 30-November 5, 2005.
16. Sayut, D. J. and Sun, L. *Engineering of the LuxR Transcriptional Activator Using Directed Evolution*, **AIChE Annual Meeting**, Cincinnati, OH, October 30-November 5, 2005.
17. Sun, L. and Keasling, J. D. *Metabolic Profiling of Desulfovibrio vulgaris*. **Annual Meeting for American Society of Microbiology**, New Orleans, LA. May 29 – June 2, 2004.
18. Sun, L. and Keasling, J. D. *Development of a Metabolomics Approach to Desulfovibrio vulgaris Functional Genomics Research*, **Metabolic Profiling Meeting**, Princeton, NJ, December 7-9, 2003.
19. Sun, L., Bulter, T., Alcalde, M., and Arnold, F. H. *Directed Evolution of Galactose Oxidase*, **IBC's Annual Enzyme Technologies**, San Francisco, CA, March 4-6, 2002.

#### Invited Presentations

1. *Engineering and Applications of Quorum Sensing*, Department of Chemical, Materials and Biomolecular Engineering, University of Connecticut, October 19, 2010

2. *Engineering and Applications of Quorum Sensing*, Biotechnology Institute, University of Minnesota, December 10, 2009
3. *Engineering Cell-Cell Communication Systems*, Department of Chemistry, University of Massachusetts Amherst, March 16, 2006

## Teaching

### Courses

1. **Molecular and Systems Biotechnology (ChE 697A)**, University of Massachusetts Amherst, Spring 2005, Instructor (with Professor Michael Henson).
2. **Chemical Engineering Thermodynamics I (ChE 621)**, University of Massachusetts Amherst, Fall 2004 (with Professor Phillip Westmoreland), Fall 2005, Instructor.
3. **Introduction to Biomolecular Engineering (ChE597C)**, University of Massachusetts Amherst, Fall 2006, Instructor.
4. **Senior Lab (ChE410)**, University of Massachusetts Amherst, Fall 2010, Instructor (Primary instructor: Professor Curt Conner)
5. **Chemical Reaction Engineering (ChE320)**, University of Massachusetts Amherst, Spring 2006, Spring 2007, Fall 2007, 2008, and 2009, Instructor.
6. **Thermodynamics I (ChE226)**, University of Massachusetts Amherst, Spring 2008 (With Professor Lakis Mountziaris and Professor David Ford), Spring 2009, Spring 2010, Instructor.

### Graduate Students Supervised (7)

- 1.
2. Pavan Kumar Reddy Kambam (2005 – 2009), Thesis Title: Engineering and Application of LuxI/LuxR Quorum Sensing Systems for Fermentation Process Development (Defended in July, 2009)
3. Daniel J. Sayut (2004 – 2010), Thesis Title: Engineering of Artificial Cellular Circuits Based on the LuxI-LuxR Quorum-Sensing System (Defended in August 2010)
  - Honors: DuPont Industrial Biotechnology Poster Award, 2007

### Postdoctoral Associates Supervised (1)

1. Dr. Yan Niu (2005-2006, 2010-2011)

### Undergraduate Students Supported (12, including 4 honors thesis students)

1. Geoff Perdum (Chemical Engineering), 2010
  - Topic: Directed Evolution
2. Joshua Drolet (Chemical Engineering), 2009-2011
  - Topic: Synthetic Biology
3. Jonathan Koppleman (Biochemistry), 2009
  - Topic: Stochastic Modeling
4. Jonathan Rayla (Chemical Engineering), 2008-2009
  - Honors: Research Assistant Fellowship (2009); Honors Research Grant (2009)
5. Shaw Fang (Chemical Engineering), 2008
  - Topic: Molecular Cloning
6. Rachel Carlos (Chemical Engineering), 2007

- Topic: Quantification of LuxR mutants
- 7. Jason Lajoie (Chemical Engineering), 2007 - 2010
  - Honors Thesis Title: Directed Evolution of RhII
  - Honors: First place in the ISPE poster competition (2008), Honors Research Grant (2009); Research Assistant Fellowship (2009)
- 8. Oladotun Fabolude (Chemical Engineering), 2006
  - Topic: Engineering of Quorum Sensing
- 9. Cheng-Yuk Lee (Chemical Engineering), 2006
  - Topic: Genetic Selection of RhII
- 10. Onyi Wong (Chemistry), 2005
  - Honors Thesis Title: Genetic Selection of LuxI
- 11. Polina Razina (Chemical Engineering), 2005
  - Topic: Engineering of the LuxR Protein
- 12. Dawn Eriksen (Chemical Engineering), 2005 – 2008
  - Honors Thesis Title: Directed evolution of LuxI and its homologs
  - Honors: Research Assistant Fellowship (2005); First place in the ISPE poster competition (2006); Goldwater Scholar (2007); 21st Century Leaders Award (2008); NSF Graduate Fellowship (2008).

### **High School Students Supervised (1)**

1. Danielle Gionet (Granby High School), 2005
  - Topic: Cloning of LuxR

### **Service**

#### **Departmental**

- Undergraduate Program Committee, Member (Department of Chemical Engineering, 2004 – 2005, 2006 – 2010).
- Graduate Program Committee, Member (Department of Chemical Engineering, 2005 – 2006)
- Departmental Seminar Coordinator (Department of Chemical Engineering, 2005 – 2006, Spring 2009, Fall 2009)
- Honors Thesis Committee (5 in Chemical Engineering, 1 in Chemistry)
- Ph. D. Thesis Committee (3 in Chemical Engineering, 3 in Chemistry)

#### **University**

- Chemistry-Biology Interface Program Academic Committee, Member (2006 – 2010)
- College of Engineering Community Diversity and Social Justice Committee, Member (2006 – 2010)
- Genomics Planning Committee, Member (2006)

#### **External**

- *Ad hoc* Reviewer for Professional Journals (16)  
ACS Chemical Biology; Applied Biochemistry and Biotechnology; Biochemistry; Biochemical Engineering Journal; Bioinformatics; Biotechnology and Bioengineering; Bioorganic and

Medicinal Chemistry Letters; Biotechnology Progress; Chemical Engineering Research and Design; Chemistry & Biology; Combinatorial Chemistry and High Throughput Screening; Current Opinions in Biotechnology; Enzyme and Microbial Technology; Journal of Applied Microbiology; Journal of Biological Engineering; Metabolic Engineering; Microbial Cell Factories; Molecular BioSystems; Organic and Biomolecular Chemistry; Protein Engineering, Design, and Selection; Process Biochemistry; Trends in Biotechnology

- *Ad hoc* Reviewer for Grant Agencies (2)  
MacArthur Foundation; National Science Foundation
- *Ad hoc* Panel Reviewer (3)  
NSF CAREER Proposal Review Panel (2008), NSF BBBE (Biotechnology, Biochemical, and Biomass Engineering) Proposal Review Panel (2009), NSF CBS (Chemical and Biological Separations) Proposal Review Panel (2010); NSF EFRI Pre-proposal and Proposal Review Panel (2011).
- Services for Professional Societies
  1. Chair, Synthetic Systems Biology, American Institute of Chemical Engineers Annual Meeting, Salt Lake City, November 7-12, 2010
  2. Area Coordinator, Biophysical and Biomolecular Processes Symposium, the Division of Biochemical Technology (BIOT), American Chemistry Society Annual Meeting, Washington DC, August 16-21, 2009
  3. Co-Chair, Advances in Protein Engineering, American Institute of Chemical Engineers Annual Meeting, Philadelphia, November 16-21, 2008
  4. Co-Chair, Advances in Biocatalysis, American Chemistry Society Annual Meeting, Boston, August 19-24, 2007
  5. Chair, Advances in Protein Engineering, American Institute of Chemical Engineers Annual Meeting, San Francisco, November 12-16, 2006

## Current and Completed Support

1. Project title: Protein purification by selective coacervation  
Role: PI (Co-PI: Paul Dubin)  
Funding agency: NSF  
Amount: \$300,000  
Period: 06/01/2010 – 05/31/2013
2. Project Title: CAREER: Engineered quorum-sensing systems for the production of protein therapeutics in *E. coli*  
Role: PI  
Funding agency: NSF  
Amount: \$400,000  
Period: 2/1/2008 – 1/31/2013
3. Project title: Mellon mutual mentoring micro (M4) grant  
Role: PI (Co-PI: T. J. Lakis Mountziaris)  
Funding agency: The Office of Faculty Development (UMass Amherst)  
Amount: \$1,200  
Period: 07/01/2008 – 06/30/2009

Lianhong Sun, USTC

4. Project title: A synthetic biology approach to understanding the NF- $\kappa$ B signaling pathways  
Role: PI  
Funding agency: American Cancer Society (via UMass Medical School Cancer Center)  
Amount: \$30,000  
Period: 04/01/2008 – 03/31/2009