

Curriculum Vitae

Lianhong Sun
Assistant Professor
Department of Chemical Engineering
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RESEARCH INTERESTS

Protein Engineering, Metabolic Engineering, and Synthetic Biology

EDUCATION

Ph. D., Chemistry 1997 – 2002
California Institute of Technology
Pasadena, California
USA

M.S., Physical Chemistry 1994 – 1997
Dalian Institute of Chemical Physics
Chinese Academy of Science
Dalian, Liaoning
P. R. China
Award: Yi-Li-Da Research Scholarship (1995)

B.S., Chemistry 1990 – 1994
Inner Mongolia University
Huhhot, Inner Mongolia
P. R. China
Award: Scholarship for Distinguished Students (1991-1994)

PROFESSIONAL EXPERIENCE

Adjunct Assistant Professor 2005 – Date
Department of Microbiology
University of Massachusetts Amherst
Amherst, MA

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

Postdoctoral Researcher 2002 – 2004

Department of Chemical Engineering
Lawrence Berkeley National Laboratory
University of California at Berkeley
Berkeley, CA

RESEARCH EXPERIENCE

Postdoctoral Researcher 2002 – 2004
Lawrence Berkeley National Laboratory
Department of Chemical Engineering
University of California-Berkeley
Advisor: Professor Jay D. Keasling
Project: *Development of a metabolomic approach for Desulfovibrio vulgaris functional genomics research*

Graduate Research Associate 1997 – 2002
Department of Chemistry and Chemical Engineering
California Institute of Technology
Advisor: Professor France H. Arnold
Thesis Title: *Engineering Galactose Oxidase to Increase Expression Level in E. coli, Enhance Thermostability and Introduce Novel Activities*

Graduate Research Associate 1994 – 1997
Laboratory of Chemical Reaction Dynamics
Dalian Institute of Chemical Physics
Chinese Academy of Science
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*

PROFESSIONAL MEMBERSHIPS

American Chemical Society (ACS)
American Institute of Chemical Engineers (AIChE)

PUBLICATIONS

Peer-Reviewed Articles:

** Papers published at UMass Amherst

1. **Kambam, P. K. R., Eriksen, D., Lajoie, J., Sayut, D. J. and Sun, L. *Altering the Substrate Specificity of RhII by Directed Evolution*, Submitted.
2. **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.
3. **Sayut, D. J., Niu, Y. and Sun, L. *Enhancing the Logical Output of a Genetic AND Gate*. Submitted.

4. **Cirino, P. C. and Sun, L. *Advancing Biocatalysis through Enzyme, Cellular, and Platform Engineering*, **Biotechnology Progress**, 24, 515-519, 2008 (Meeting Review).
5. **Kambam, P., Sayut, D. J., Niu, Y., Eriksen, D. T., and Sun, L. *Directed Evolution of LuxI for Enhanced OHL Production*, **Biotechnology and Bioengineering**, In Press (DOI: 10.1002/bit.21901).
6. **Kambam, P., Henson, M. A., and Sun, L. *Design and Mathematical Modeling of a Synthetic Symbiotic Ecosystem*, **IET Systems Biology**, 2, 33-38, 2008.
7. **Sayut, D. J., Kambam, P., and Sun, L. *Noise and Kinetics of Positive Feedback Loops*, **Biochemical and Biophysical Research Communications**, 363, 667-673, 2007.
8. **Sayut, D. J., Kambam, P., and Sun, L. *Engineering and Applications of Genetic Switches*, **Molecular BioSystems**, 3, 835-840, 2007 (Invited Review).
9. **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**).
10. 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.
11. 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.
12. Chen, H., Ma, Y. B., Zou, S. L., Dong, F., Tan, X. F., Sun, L. H., Su, D. D., and Li, X. C. *Ionization Process of Collision of $Ne(^3P_{2,0})$ with CO under Molecular Beam Conditions*, **Chinese Science Bulletin**, 43, 477-480, 1998.
13. Zou, S. L., Ma, Y. B., Dong, F., Tan, X. F., Chen, H., Sun, L. H., Xu, D. D., and Li, X. C. *Penning Ionization Process of $CO+He(2^3S)$ Under Single Collision Conditions*, **Progress in Natural Sciences**, 8, 451-456, 1998.
14. Xu, D.D., Shen, G. L., Chen, H., Sun, L. H., Li, X. C., and Lou, N. Q. *Branching Ratios and Rovibrational Distributions of $NO(A/B, \mu)$ from the Reaction $CO(a, \mu') + NO(X)$ in Beams*, **Progress in Natural Sciences**, 7, 234-238, 1997.

Book Chapters:

1. Sun, L. and Yagasaki, M. *Screen for Oxidase by Detection of Hydrogen Peroxide with Horseradish Peroxidase*. In **Methods of 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.
2. Salazer, O. and Sun, L. *Mutant Library Analysis*. In **Methods of 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.
3. Georgescu, R., Bandara, G. and Sun, L. *Saturation Mutagenesis*. In **Methods of Molecular Biology**, 230, 75-84, 2003. Directed Evolution: Library Creation. (Arnold, F. H. and Georgiou, G. Eds.), Humana Press Inc., Totowa, NJ.

PATENTS

** Patents filed at UMass Amherst

1. **Sun, L. and Kambam, P. *LuxI Mutants for Improved Production of OHHL*, **UM08-05**, Pending
2. **Sun, L. and Sayut, D. J. *An Ultrasensitive Inducible Gene Switch*, **UM07-10**, Pending
3. Arnold, F. H., Petrounia, I. P. and Sun, L. *Directed Evolution of Oxidase Enzymes*. **USA Patent No. US7098010B1**
4. Arnold, F. H., Petrounia, I. P. and Sun, L. *Directed Evolution of Galactose Oxidase*. **USA Patent No. US7115403B1**
5. Arnold, F. H., Sun, L. and Petrounia, I. P. *Novel Glucose 6-Oxidase*. **USA Patent No. US7220563**

INVITED PRESENTATIONS

1. *Engineering Cell-Cell Communication Systems*, Department of Chemistry, University of Massachusetts Amherst, March 16, 2006.

CONFERENCE PRESENTATIONS

1. Kambam, P., Sayut, D. J., and Sun, L. *Overproduction of OHHL in E. coli via Directed Evolution and Metabolic Engineering*, **AICHE Annual Meeting**, Salt Lake City, UT, November 4-9, 2007.
2. 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.
3. Kambam, P. and Sun, L. *Directed Evolution of LuxI for Improved OHHL Production*, **ACS Annual Meeting**, Boston, MA, August 19-27, 2007.
4. 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.
5. 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.
6. 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.
7. Sun, L. and Henson, M. A. *Development of a Molecular and Systems Biotechnology Course*, **AICHE Annual Meeting**, Cincinnati, OH, October 30-November 5, 2005.
8. 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.
9. 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.
10. 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.

11. 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.

TEACHING

Courses

- **Chemical Reaction Engineering (ChE320)**, University of Massachusetts Amherst, Spring 2006, Spring 2007, and Fall 2007, Instructor.
- **Introduction to Biomolecular Engineering (ChE597C)**, University of Massachusetts Amherst, Fall 2006, Instructor.
- **Chemical Engineering Thermodynamics I (ChE 621)**, University of Massachusetts Amherst, Fall 2005, Instructor.
- **Chemical Engineering Thermodynamics I (ChE 621)**, University of Massachusetts Amherst, Fall 2004, Instructor (with Professor Phillip R. Westmoreland).
- **Molecular and Systems Biotechnology (ChE 697A)**, University of Massachusetts Amherst, Spring 2005, Instructor (with Professor Michael A. Henson).

Graduate Students

- Daniel J. Sayut (2004 – date), Thesis Title: Engineering of Genetic Circuits
 - Honors: DuPont Industrial Biotechnology Poster Award, 2007
- Pavan Kumar Reddy Kambam (2005 – date), Thesis Title: Engineering of Quorum Sensing

Postdoctoral Associates

- Yan Niu (2005-2006)

Undergraduate Students

- Shaw Fang (Chemical Engineering), 2008
- Rachel Carlos (Chemical Engineering), 2007
 - Topic: Quantification of LuxR mutants
- Jason Lajoie (Chemical Engineering), 2007 - date
 - Topic: Directed evolution of RhII
- Oladotun Fabolude (Chemical Engineering), 2006
 - Topic: Engineering of Quorum Sensing
- Cheng-Yuk Lee (Chemical Engineering), 2006
 - Topic: Genetic Selection of RhII
- Onyi Wong (Chemistry), 2005
 - Honors Thesis Title: Genetic Selection of LuxI (*summa cum laude*)
- Polina Razina (Chemical Engineering), 2005
 - Topic: Engineering of the LuxR Protein
- Dawn Eriksen (Chemical Engineering), 2005 – 2008
 - Honors Thesis Title: Directed evolution of LuxI and its homologs
 - Honors: Goldwater Scholar (2007); First place in the ISPE poster competition (2006).

High School Students

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

SERVICES

Departmental

- Undergraduate Program Committee (Department of Chemical Engineering, 2006 – date)
- Graduate Program Committee (Department of Chemical Engineering, 2005 – 2006)
- Department Seminar Coordinator (Department of Chemical Engineering, 2005 – 2006)
- Undergraduate Program Committee (Department of Chemical Engineering, 2004 – 2005)

University

- CBI Program Academic Committee (2006 – 2007)
- COE Community Diversity and Social Justice Committee (2006 – date)
- Genomics Planning Committee (2006)

External

- *Ad hoc* Reviewer for Professional Journals
 - 1) Applied Biochemistry and Biotechnology
 - 2) Biotechnology and Bioengineering
 - 3) Biotechnology Progress
 - 4) Combinatorial Chemistry and High Throughput Screening
 - 5) Enzyme and Microbial Technology
 - 6) Metabolic Engineering
 - 7) Protein Engineering, Design, and Selection
- *Ad hoc* Reviewer for Grant Agencies
 - 1) National Science Foundation
- Service for Professional Societies
 - 1) Co-Chair, Advances in Protein Engineering, AIChE Annual Meeting, Philadelphia, November 16-21, 2008
 - 2) Co-Chair, Advances in Biocatalysis, ACS Annual Meeting, August 19-24, 2007
 - 3) Chair, Advances in Protein Engineering, AIChE Annual Meeting, San Francisco, November 12-16, 2006