

Leo d'Espaux
193 Alpine Terrace
San Francisco, CA 94117
305.323.8426
leodespaux@gmail.com

Born in Havana, Cuba. US Citizen (naturalized)

EDUCATION

Ph.D.	Chemical Engineering	California Institute of Technology	6/2013
M.S.	Chemical Engineering	California Institute of Technology	6/2007
B.S.	Chemical Engineering	Cornell University	6/2005

GRANTS AND AWARDS

Graduate Research Fellowship, National Science Foundation <i>Awarded to ~500 engineering applicants nationally</i> \$124,000 total support*	2006 – 2011
Betty and Gordon Moore Fellowship, Caltech <i>Awarded to 1-2 students per Caltech department</i> \$130,000 total support*	2005 – 2011
Gates Millenium Graduate Scholar, Bill and Melinda Gates Foundation <i>Awarded to continuing undergraduate fellows, out of 1,000 applicants nationally</i> \$240,000 total support*	2005 – 2007
Menschel Public Service Fellowship, Cornell University <i>Internship funding for summer undergraduate research</i> \$5,000 award	2005
Slayton Evans Research Award, American Chemical Society <i>Award for undergraduate research</i> \$3,500 award	2003
Alumni Sponsored Research Award, Cornell University <i>Award for undergraduate research</i> \$1,000 award	2003
Presidential Research Scholar, Cornell University <i>Awarded to top 1% of applicants to the university based on research potential</i> \$48,000 total support	2001 – 2005
ACS-Xerox Scholar, American Chemical Society <i>Awarded to ~100 applicants nationally for academic excellence</i> \$20,000 total support	2001 – 2005
Gates Millenium Scholar, Bill and Melinda Gates Foundation <i>Awarded to 1,000 applicants nationally</i> \$140,000 total support	2001 – 2006

**Funds not fully distributed due to overlapping award periods resulting in excess funding.*

PROFESSIONAL EXPERIENCE

Visiting Researcher, Department of Bioengineering, Stanford

1 / 2009 – present

Advisor: Christina D. Smolke

Research: Synthetic gene regulation with applications in gene therapy and green production of natural and synthetic chemicals

- Constructed a versatile genetic amplifier in eukaryotic cells that allows for near-digital control over output gene expression in response to changing levels of input signal molecules
- Expanded range of molecules the gene-regulatory platform can take as inputs to encompass intracellular proteins
- Responsible for training and compliance for laboratory-wide use of radioactive materials
- Trained and supervised multiple graduate, undergraduate, and high school students
- Successfully led several collaborative projects

Teaching Assistant, Department of Chemical Engineering, Caltech

2 / 2008 – 6 / 2008

Instructor: Zhen-Gang Wang

Teaching: Classical and statistical thermodynamics to undergraduates

- Prepared weekly lectures, designed, and graded weekly problem sets for forty undergraduate chemical engineers

Graduate Fellow, Department of Chemical Engineering, Caltech

9 / 2005 – 1 / 2009

Advisor: Christina D. Smolke

Department of Chemical Engineering, Caltech

Research: Control of gene expression through non-coding RNA, strategies to regulate gene silencing in cancer cells

- Designed RNA devices that allow for gene silencing conditional on intracellular signals

Research Assistant, HHMI, The Rockefeller University

6 / 2005 – 9 / 2005

Advisor: Günter Blobel (*1999 Nobel laureate in Physiology or Medicine*)

Research: Mechanism of transport across nuclear pore

- Cloning and protein purification for crystallography studies of nuclear transport

Research Assistant, Department of Biological Engineering, Cornell

1 / 2002 – 5 / 2005

Advisor: Dan Luo

Research: DNA-based materials

- Helped design and construct dendritic DNA structures with applications in materials rational self-assembly, pathogen detection, and encoded communications
- Characterized nanometer-scale structures via atomic force microscopy
- Supervised several undergraduate students

Research Assistant, Department of Chemical Engineering, Cornell

9/2001 – 5/2002

Advisor: W. Mark Saltzman

Research: Tissue engineering of bone tissue. Polymer-based drug delivery to the brain

- Synthesized and optimized degradable polymer-encapsulated DNA for gene therapy
- Analyzed kinetics of DNA delivery to the brain
- Optimized substrates for proliferation of bone cells for tissue engineering

PUBLICATIONS

1. **LD d’Espaux**, YH Wang, and CD Smolke. 2013. A modular genetic amplifier for near-digital control over eukaryotic gene expression. *In preparation*.
2. **LD d’Espaux**, AB Kennedy, JV Vowles, and CD Smolke. 2013. Synthetic protein-responsive ribozyme switches in eukaryotic cells. *In preparation*.
3. Y Li, YD Tseng, SY Kwon, **LD d’Espaux**, JS Bunch, PL McEuen and D Luo. 2004. Controlled assembly of dendrimer-like DNA. *Nature Materials* 3, 38-42.

CONFERENCE POSTERS AND PRESENTATIONS

1. **LD d’Espaux**, AB Kennedy, and CD Smolke. 2013. Modular non-coding RNA to regulate eukaryotic gene expression. Society for Biological Engineering International Conference on Biomolecular Engineering, Fort Lauderdale, FL, January, 2013.
2. **LD d’Espaux** and CD Smolke. 2008. Programmable molecular sensors for the design of intelligent therapeutics targeted to breast cancer cells. Department of Defense Breast Cancer Research Program Era of Hope Meeting, Baltimore, MD, July, 2008.
3. **LD d’Espaux** and D Luo. 2004. Honeycomb-shaped DNA. American Chemical Society 228th National Meeting & Exposition, Philadelphia, PA, August, 2004.
4. **LD d’Espaux** and D Luo. Dendrimer-like DNA. 2004. Cornell Presidential Research Scholars Progress Forums, Ithaca, NY, March, 2004.
5. **LD d’Espaux** and D Luo. Honeycomb-shaped DNA. Undergraduate Research Board 18th Annual Forum, Ithaca, NY, April, 2003.
6. **LD d’Espaux** and D Luo. Self-assembled DNA materials. 2003. Cornell Presidential Research Scholars Progress Forums, Ithaca, NY, March, 2003.

SKILLS

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| • Molecular biology, including restriction-enzyme cloning, Gibson assembly, and recombinase-mediated methods | • Atomic force and confocal microscopy |
| • Yeast genetic manipulation | • Modeling with Matlab, some Java, C++ |
| • Control of protein expression level and localization | • qRT-PCR |
| • Protein purification and characterization | • Use of radioactive substances |
| • Mammalian tissue culture | • Surface plasmon resonance |
| • Flow cytometry | • Nucleic acid <i>in vitro</i> characterization |
| | • Functional RNA design |
| | • Biological circuit design |

REFERENCES

Christina D. Smolke, Ph.D.
Associate Professor
Associate Chair of Education, and
W.M. Keck Foundation Faculty Scholar
Department of Bioengineering, Stanford University
650-721-6371
christina.smolke@stanford.edu

Dan Luo, Ph.D.
Professor
Department of Biological Engineering, Cornell University
607-255-8193
DL79@cornell.edu

Yvonne Chen, Ph.D.
Assistant Professor
Department of Chemical and Biomolecular Engineering, UCLA
310-825-2816
yvonne.chen@ucla.edu

Zhen-Gang Wang, Ph.D.
Professor
Department of Chemical Engineering, Caltech
626-395-4647
zgw@cheme.caltech.edu