

Curriculum Vitae

Steven S. Andrews

Physical Biosciences Division
Lawrence Berkeley National Laboratory
1 Cyclotron Road, M.S. 977-152
Berkeley, CA 94720

Home:
2620 Dana Street, Apt. B
Berkeley, CA 94704

510-710-9989
ssandrews@lbl.gov
<http://sahara.lbl.gov/~sandrews/index.html>

Education

Cold Spring Harbor Laboratory. Advanced Bacterial Genetics summer course, 2005.

Stanford University. PhD in chemistry, awarded June 2001.
Dissertation title: "The Measurement and Physics of Vibrational Stark Effects."
Awarded Annual Reviews Prize in Physical Chemistry.

Stanford University. PhD minor in Physics, completed 1997.

Dartmouth College. B.A. 1991 in chemistry. GPA: 3.62, 3.72 within the major.
Awards and honors: graduation *cum laude* with high honors in chemistry, associate member of Sigma Xi,
Haseltine Chemistry-Physics Prize, first place Thayer Math Prize.

Fellowship

National Science Foundation postdoctoral fellowship in Biological Informatics, 2003-2005.
Title of proposal: "Standard functional motifs in biochemical networks."

Research Experience

University of California at Berkeley. Post-doc, 2005-present. Co-advisors: Dr. Jay Groves and Dr. Adam Arkin (Lawrence Berkeley National Laboratory).

- Microscopy and analytical chemistry on the *E. coli* Min system, using *in vitro* methods.

Lawrence Berkeley National Laboratory. Research associate, 2003-present. Advisor: Dr. Adam Arkin.

- Continuing work on spatial stochastic simulation methods.
- Investigation of the *E. coli* Min system, which helps locate the cell division site.
- Computer simulations of the evolution of bacterial biochemical networks.
- Statistical mechanics of membrane-bound protein polymers.

University of Cambridge. Research associate, 2001-2003. Supervisor: Dr. Dennis Bray.

- Development of stochastic models of intracellular diffusion and signal transmission.
- Studied correlated ligand bindings to clustered receptors.

Stanford University. Graduate student, 1994-2001. Advisor: Prof. Steven Boxer.

- Experimental study of vibrational Stark effects of nitriles. This included designing and building equipment, writing software for data analysis, and interpretation of results.
- Measured first vibrational Stark effect in a protein.

- Measured first mid-infrared electronic Stark effect.
- Designed a novel optical liquid nitrogen immersion cryostat for infrared and visible use.
- Developed analytical theory of vibrational Stark effects.
- Studied dynamical behavior of electron transfer.
- Measured ultrafast transient infrared absorption of photosynthetic reaction center analog.
- Wrote simulation for electrophoresis and diffusion of multicomponent lipid bilayers.

Woods Hole Oceanographic Institution, Research assistant, 1993-1994. Mentor: Dr. Oliver Zafiriou.

- Studied the photochemical oxidation of seawater, with implications for the marine carbon cycle, by analysis of dissolved oxygen uptake during ultraviolet irradiation.
- Studied photoproduction of dissolved carbon monoxide in seawater, including methodology improvements and work at sea in the North Atlantic and North and South Pacific Oceans.
- Measured optical absorption properties of seawater.

Mount Washington Observatory, Intern for meteorology and icing research, 1991-1992. Mentors: Kenneth Rancourt, Joel White, and Guy Gosslin.

- Measured cloud droplet sizes by icing techniques, and wrote computer fitting program for data reduction.
- Analyzed ice formation and removal on various surfaces and structures.
- Recorded weather for National Weather Service.

Dartmouth College, Research assistant, 1991. Mentor: Prof. Jane Lipson.

- Studied the conformational properties of self avoiding walks in restricted space, with applications to protein folding.
- Developed a smooth continuum random walk and studied its conformational properties.

Dartmouth College, Undergraduate research, 1991. Advisor: Prof. Jane Lipson.

- Thesis title: "An Integral Equation Treatment of a Compressible Fluid." Studied thermodynamics and statistical mechanics of *n*-alkanes and polymers.

Teaching Experience

Lawrence Berkeley National Laboratory, 2004.

- Mentor for graduate students: Josh Adelman, David Soergal, and Sophia Tang.

Stanford University Outdoor Education Program, Volunteer instructor, 1997-2001.

- Introductory and advanced wilderness skills (GES 7), supervised by Prof. Dennis Bird.

Stanford University Head Teaching Assistant, 1995.

- Advanced freshman chemistry (chem 32), taught by J.P. Coleman and R.N. Zare.

Stanford University Teaching Assistant, 1994-1995.

- Advanced freshman chemistry (chem 32), taught by J.P. Coleman, and R.N. Zare.
- Physical chemistry laboratory (chem 174), taught by C.E.D. Chidsey.
- Beginning chemistry laboratory (chem 36), taught by K.O. Hodgson.

Barrier Island Environmental Education Center, Seabrook Island, South Carolina, 1992.

- Coastal ecology and related classes for children in fourth to eighth grades.

Publications

Andrews, Steven S. and Adam P. Arkin. "Quantification of reaction rate constants in the *Escherichia coli* Min system." In preparation, 2005.

- Andrews, Steven S. and Adam P. Arkin. "Investigations of evolution and niche partitioning as optimization processes using simulated chemostat models." In preparation, 2005.
- Andrews, Steven S. and Adam P. Arkin. "A physical explanation for the shape of the bacterial cytoskeleton and other membrane-bound protein polymers." In preparation, 2005.
- Andrews, Steven S. and Adam P. Arkin. "Simulated niche partitioning by bacteria." *Proc. Intl. Conf. on Complex Systems*, 2005.
- Andrews, Steven S. "Serial rebinding of ligands to clustered receptors as exemplified by bacterial chemotaxis." *Phys. Biol.* 2:111-122, 2005.
- Lipkow, Karen, Steven S. Andrews, and Dennis Bray. "Simulated diffusion of CheYp through the cytoplasm of *E. coli*." *J. Bact.* 187:45-53, 2005.
- Adelman, Joshua L. and Steven S. Andrews. "Intracellular pattern formation: A spatial stochastic model of bacterial division site selection proteins MinCDE." *Proc. Santa Fe Inst. Summer School*, 2004.
- Andrews, Steven S. and Dennis Bray. "Stochastic simulation of chemical reactions with spatial resolution and single molecule detail." *Phys. Biol.* 1:137-151, 2004.
- Goldman, Jacki, Steven S. Andrews, and Dennis Bray. "Size and composition of membrane protein clusters predicted by Monte Carlo analysis." *Eur. Biophys. J.* 33:506-512, 2004.
- Andrews, Steven S. "Using rotational averaging to calculate the bulk response of isotropic and anisotropic samples from molecular parameters." *J. Chem Ed.* 81:877-885, 2004.
- Treynor, Thomas P., Steven S. Andrews, and Steven G. Boxer. "Intervalence band Stark effect of the special pair radical cation in bacterial photosynthetic reaction centers." *J. Phys. Chem. B* 107:11230-11239, 2003.
- Zafiriou, Oliver C., Steven S. Andrews, and Wei Wang. "Concordant estimates of oceanic carbon monoxide source and sink processes in the Pacific yield a balanced global 'blue-water' CO budget." *Global Biogeochemical Cycles* 17:1015, 2003.
- Xie, Huixiang, Steven S. Andrews, William R. Martin, Jared Miller, Lori Ziolkowski, Craig D. Taylor, and Oliver C. Zafiriou. "Validated methods for sampling and headspace analysis of carbon monoxide in seawater." *Marine Chem.* 77:93-108, 2002.
- Andrews, Steven S. and Steven G. Boxer. "Vibrational Stark effects of nitriles. II. Physical origins of Stark effects from experiment and perturbation models." *J. Phys. Chem A* 106:469-477, 2002.
- Andrews, Steven S. and Steven G. Boxer. "Analysis of noise for rapid-scan and step-scan FTIR difference spectroscopy." *Appl. Spectrosc.* 55:1161-1165, 2001.
- Andrews, Steven S. and Steven G. Boxer. "Vibrational Stark effects of nitriles. I. Methods and experimental results." *J. Phys. Chem. A* 104:11853-11863, 2000.
- Andrews, Steven S. and Steven G. Boxer. "A liquid nitrogen immersion cryostat for optical measurements." *Rev. Sci. Instr.* 71:3567-3569, 2000.
- Andrews, Steven S., Sigalit Caron, and Oliver C. Zafiriou. "Photochemical oxygen consumption in marine waters: A major sink for colored dissolved organic matter?" *Limnol. Oceanog.* 45:267-277, 2000.
- Park, Eun Sun, Steven S. Andrews, Robert B. Hu, and Steven G. Boxer. "Vibrational Stark spectroscopy in proteins: A probe and calibration for electrostatic fields." *J. Phys. Chem. B* 103: 9813-9817, 1999.
- Weiss, Peter S., Steven S. Andrews, James E. Johnson, and Oliver C. Zafiriou. "Photoproduction of carbonyl sulfide in South Pacific Ocean waters as a function of irradiation wavelength." *Geophys. Res. Lett.* 22:215-218, 1995.
- Lipson, J.E.G. and S.S. Andrews. "A Born-Green-Yvon Integral Equation Treatment of a Compressible Fluid." *J. Chem. Phys.* 96:1426-1434, 1992.

Abstracts

- Andrews, S.S. and A.P. Arkin, "Helices in bacteria: simulations of membrane-bound protein polymers." Presented at the QB3 Symposium on Cell Membrane Systems and Technology, 2005.
- Andrews, S.S. and A.P. Arkin, "Helices in bacteria: simulations of membrane-bound protein polymers." Presented at the Third International Symposium on Computational Cell Biology, 2005.
- Andrews, S.S., J. Adelman, and A.P. Arkin, "Simulated spontaneous oscillation and pattern formation by Min proteins." Presented at the Second International *E. coli* Alliance Conference on Systems Biology, 2004.

- Andrews, S.S. and A.P. Arkin, "Simulated niche partitioning by bacteria." Presented at the International Conference on Complex Systems, 2004.
- Andrews, S.S. and D. Bray, "Molecular level simulations of biochemical diffusion and reactions." Presented at the First International *E. coli* Alliance Conference on Systems Biology of *E. coli*, 2003.
- Andrews, S.S. and Dennis Bray, "Reaction and diffusion simulations at the molecular level." Presented at the Second International Symposium on Computational Cell Biology, 2003.
- Treynor, T.P., S.S. Andrews, and S.G. Boxer, "Stark spectroscopic investigation of the electronic properties of the Rb. sphaeroides special pair radical cation at 77 K." Presented at Biophysical Society meeting, 2002.
- Wang, W., S.S. Andrews, and O.C. Zafiriou, "The marine carbon dioxide budget: global blue-water photoproduction of ~40 Tg CO₂/year based on concordant source and sink estimates in the N. and S. Pacific." Presented at American Society for Limnology and Oceanography meeting, 2001.
- Andrews, S.S. and S.G. Boxer, "Vibrational Stark effects of nitriles." Presented at American Chemical Society meeting, 2000.
- Park, E.S., S.S. Andrews, R.B. Hu, and S.G. Boxer, "Vibrational Stark spectroscopy in proteins: a probe and calibration for electrostatic fields." Presented at American Chemical Society meeting, 2000.
- Park, E.S., S.S. Andrews, R.B. Hu, and S.G. Boxer, "Vibrational Stark spectroscopy in proteins: a probe and calibration for electrostatic fields." Presented at Biophysical Society meeting, 2000.
- Zafiriou, O.C. and S.S. Andrews, "Photoproduction of CO in N. and S. Pacific surface waters: wavelength dependent quantum yields, potential rates, and the origins of precursor CDOM." Presented at American Society of Limnology and Oceanography meeting, 1997.

Publicly Available Software (all open source)

- Andrews, Steven S. *SpectFit* - An interactive program for fitting and manipulating data. Macintosh operating system 10. 1996 (latest version released 2002).
- Andrews, Steven S. *Smoldyn* - A Brownian dynamics type simulation of reaction-diffusion systems at the Smoluchowski level of approximation. Macintosh operating system 10. 2003 (latest version released 2005).
- Andrews, Steven S. *Rebinding* - A specialized program for investigating the rebinding of a ligand to a cluster of receptors. C language source code. 2005.

References

Dr. Adam Arkin
Physical Biosciences Division
Lawrence Berkeley National Laboratory
1 Cyclotron Road, M.S. 977-152
Berkeley, CA 94720
phone: 510-495-2366
e-mail: aparkin@lbl.gov

Dr. Steven Boxer
Department of Chemistry
Stanford University
380 Roth Way, Keck-325
Stanford, CA 94305-5080
phone: 650-723-4482
e-mail: sboxer@stanford.edu

Dr. Dennis Bray
Department of Anatomy
University of Cambridge
Cambridge CB2 3DY
UK
phone: +44-1223-333771
e-mail: db10009@cam.ac.uk

Dr. Jay Groves
Department of Chemistry
University of California
Berkeley, CA 94720
phone: 510-643-0186
e-mail: jtgroves@lbl.gov