STEPHEN D. FRIED

email sf537@cam.ac.uk

website http://www.mrc-lmb.cam.ac.uk/sfried

phone +44 1223 267898

APPOINTMENTS & POSITIONS

2014–to date King's College, Cambridge, UK
Junior Research Fellow

2014–to date MRC Laboratory of Molecular Biology, Cambridge, UK
Visiting Researcher

2016–to date European Bioinformatics Institute, Hinxton, UK
Visiting Researcher

EDUCATION

Ph.D. *2009–2014* Stanford University, Stanford, CA, USA

Dissertation: *On the Origins of Catalysis by Ketosteroid Isomerase*
Advisor: Prof. S. G. Boxer

Bachelor's *2005–2009* Massachusetts Institute of Technology, Cambridge, MA, USA

S.B.s in Chemistry and Physics. Minor in History
Thesis: *Oxygen-Oxygen Bonds: Catalytic Redox Pathways in Energy Storage*
Advisors: Prof. A. Tokmakoff & Prof. D. G. Nocera

TEACHING EXPERIENCE

2016–2018 Part 1B, Biochemistry and Molecular Biology (supervisor)

Modules covered topics in structure and function of proteins and nucleic acids, regulation of gene expression, metabolism, and signaling.

2015–2016 Part 1A, Chemistry (supervisor)

Modules covered topics in organic, inorganic, and physical chemistry.

2014–2105 Part 1B, Biochemistry and Molecular Biology (supervisor)

2014 CHEM 185: Advanced Biophysical Chemistry (head TA)

Coordinated discussions; mentored students; assigned and marked final papers.

2013 CHEM 135: Physical Chemistry Principles (head TA)

Designed the curriculum; wrote and managed assignments, exams, and course materials.

2011 CHEM 221: Physical Organic Chemistry (TA)

2010 CHEM 173: Quantum Mechanics (TA)

2009 CHEM 131: Organic Chemistry III (TA)

PUBLICATIONS

H-index = 11 (Google scholar profile).

(20) **Fried, S. D.**; Boxer, S. G.
DOI-link "Electric Fields and Enzyme Catalysis."
Annu. Rev. Biochem. **2017**, 86, 387–415.

(19) Wang, L.; **Fried, S. D.**; Markland, T. E.
DOI-link "Proton Network Flexibility Enables Robustness and Large Electric Fields in the Ketosteroid Isomerase Active Site."
J. Phys. Chem. B **2017**, DOI: 10.1021/acs.jpcb.7b06985

(18) Boxer, S. G.; **Fried, S. D.**; Schneider, S. H.; Wu, Y.
"Electric Fields and Enzyme Catalysis."
Proceedings of the 24th International Solvay Conference on Chemistry, World Scientific Publishing Co. **2017**.

(17) Elliott, T. S.; Biano, A.; Townsley, F. M.; **Fried, S. D.**; Chin, J. W.
DOI-link "Tagging and Enriching Proteins Enables Cell-Specific Proteomics."
Cell Chem. Biol. **2016**, 23, 805–815.

(16) Wu, Y.; **Fried, S. D.**; Boxer, S. G.
DOI-link "Dissecting Proton Delocalization in an Enzyme's Hydrogen Bond Network with Unnatural Amino Acids."
Biochemistry **2015**, 54, 7110–7119.

(15) **Fried, S. D.**; Schmied, W. H.; Uttamapinant, C.; Chin, J. W.
DOI-link "Ribosome Subunit Stapling for Orthogonal Translation in E. coli."
Angew. Chem. Int. Ed. **2015**, 54, 12791–12794.

(14) **Fried, S. D.**; Boxer, S. G.
DOI-link "Response to Comments on "Extreme electric fields power catalysis in the active site of ketosteroid isomerase."
Science **2015**, 349, 936.

(13) **Fried, S. D.**; Boxer, S. G.
DOI-link "Measuring Electric Fields and Noncovalent Interactions Using the Vibrational Stark Effect."
Accounts of Chemical Research **2015**, 48, 998–1006.

(12) Wang, L.; **Fried, S. D.**; Boxer, S. G.; Markland, T. E.
DOI-link "Quantum Delocalization of Protons in the Hydrogen Bond Network of an Enzyme Active Site."
Proc. Natl. Acad. Sci. USA **2014**, 111, 18454–18459.

(11) **Fried, S. D.**; Bagchi, S.; Boxer, S. G.
DOI-link "Extreme Electric Fields Drive Catalysis in an Enzyme Active Site."
Science **2014**, 346, 1510–1514.

(10) Mu, X.; Wang, Q.; Wang, L.-P.; **Fried, S. D.**; Piquemal, J.-P.; Dalby, K. N.; Ren, P.
DOI-link "Modeling Organochlorine Compounds and the σ-hole Effect Using a Polarizable Multipole Force Field."
J. Phys. Chem. B **2014**, 118, 6456–6465.

(9) **Fried, S. D.**; Wang, L.-P.; Boxer, S. G.; Ren, P.; Pande, V. S.
DOI-link "Calculations of the Electric Fields in Liquid Solutions."
J. Phys. Chem. B **2013**, 117, 16236–16248.

(8) **Fried, S. D.**; Boxer, S. G.
DOI-link

"Thermodynamic Framework for Identifying Free Energy Inventories of Enzyme Catalytic Cycles."
Proc. Natl. Acad. Sci. USA **2013**, 110, 12271–122276.

(7) **Fried, S. D.**; Bagchi, S.; Boxer, S. G.
DOI-link "Measuring Electrostatic Fields in Both Hydrogen Bonding and non-Hydrogen Bonding Environments Using Carbonyl Vibrational Probes."
J. Am. Chem. Soc. **2013**, 135, 11181–11192.

(6) Sigala, P. A.; Fafarman, A. T.; Schwans, J.P.; **Fried, S. D.**; Fenn, T. D.; Caaveiro, J. M. M.; Pybus, B.; Ringe, D.; Petsko, G. A.; Boxer, S. G.; Herschlag, D.
DOI-link "Quantitative Dissection of Hydrogen Bond-Mediated Proton Transfer in the Ketosteroid Isomerase Active Site."
Proc. Natl. Acad. Sci. USA **2013**, 110, E2552–E2561.

(5) Bagchi, S.; **Fried, S. D.**; Boxer, S. G.
DOI-link "A Solvatochromic Model Calibrates Nitriles' Vibrational Frequencies to Electrostatic Field."
J. Am. Chem. Soc. **2012**, 134, 10373–10376.

(4) Levinson, N. M.; **Fried, S. D.**; Boxer, S. G.
DOI-link "Solvent-induced Infrared Frequency Shifts in Aromatic Nitriles are Quantitatively Described by the Vibrational Stark Effect."
J. Phys. Chem. B **2012**, 116, 10470–10476.

(3) **Fried, S. D.**; Boxer, S. G.
DOI-link "Evaluation of the Energetics of the Concerted Acid-Base Mechanism in Enzymatic Catalysis: The Case of Ketosteroid Isomerase."
J. Phys. Chem. B **2012**, 116, 690–697.

(2) **Fried, S. D.**; Kanan, M. W.; Nocera, D. G.
"Bridged Bisindole Carboxylates as a Model for Oxidative O-O Homocoupling."
The Nucleus **2008**, 86, 9, 14–20.

(1) Rosenthal, J.; Chng, L. L.; **Fried, S. D.**; Nocera, D. G.
DOI-link "Stereoelectronic Control of H_2O_2 Dismutation by Hangman Porphyrins."
Chem. Commun. **2007**, 25, 2642–2644.

CONFERENCES

Oral Presentations

(3) Boxer, S. G.; **Fried, S. D.**; Wu, Y.; Schneider S.
October 2016 "Electric Fields and Enzyme Catalysis."
24^{th} International Solvay Conference on Chemistry, Brussels, Belgium.

(2) **Fried, S. D.**; Schmied, W. H.; Uttamapinant, C.; Chin J. W.
September 2015 "Ribosome Subunit Fusion Liberates the Large Subunit for Neofunctionalization."
Engineering Life 2015 Symposium, Dresden, Germany.

(1) **Fried, S. D.**; Bagchi, S.; Boxer, S. G.
February 2013 "Vibrational Stark Effects in the Active Site of Ketosteroid Isomerase Point to Large Electric Fields Driving Chemical Catalysis."
57^{th} Biophysical Society Annual Meeting, Philadelphia, PA, USA.

Poster Presentations

(6) **Fried, S. D.**; Wu, Y.; Schneider, S. H.; Boxer, S. G.
June 2016 "Extreme Electric Fields and Electrostatic Preorganization in Enzyme Catalysis."
EMBO Conferences: Chemistry of Biocatalysis: From Understanding to Design, Oulu, Finland

(5) **Fried, S. D.**; Wang, L.-P.; Boxer, S. G.; Ren, P.; Pande, V. S.
February 2014 "Calculations of the Electric Fields in Solutions and Proteins."
58th Biophysical Society Annual Meeting, San Francisco, CA.

(4) **Fried, S. D.**; Wang, L.-P.; Boxer, S. G.; Ren, P.; Pande, V. S.
October 2013 "Calculations of the Electric Fields in the Solution Phase."
Johnson Symposium, Stanford, CA.

(3) **Fried, S. D.**; Boxer, S. G.
February 2012 "An Amendment to Pauling's Paradigm of Transition State Binding."
56th Biophysical Society Annual Meeting, San Diego, CA.

(2) **Fried, S. D.**; Boxer, S. G.
July 2011 "A Modification to Pauling's Paradigm of Transition State Binding."
RSC Challenges in Chemical Biology, Manchester, UK.

(1) **Fried, S. D.**; Boxer, S. G.
October 2010 "How to Catalyze an Enolization Reaction: Getting some tips from the expert, Ketosteroid Isomerase."
Johnson Symposium, Stanford, CA.

HONORS

2014 Annual Reviews Prize for Best Dissertation in Physical Chemistry

2013 Invited to the 63rd Meeting of Nobel Laureates in Lindau

2013 Enzymes section co-chair at the 57th Biophysical Society Annual Meeting

2012 Stanford Interdisciplinary Graduate Fellow

2012 Stanford Bio-X Fellow

2009 MIT Department of Chemistry Alpha Chi Sigma Award

2009 Sigma Pi Sigma – Physics Honor Society

2009 Hertz Fellowship Finalist

2009 NSF Graduate Research Fellow

2009 Phi Beta Kappa

2007 ACS Norris Richards Scholar for Undergraduate Research

2007 MIT Department of Chemistry Sophomore Achievement Award

LANGUAGES

Human

English – Mother tongue

French – Intermediate

Hebrew – Intermediate

Computer

PYTHON

MatLab

FORTRAN

LaTeX

Bash

COLLABORATIONS

2016–	Prof. Reudi Aebersold (ETH Zurich) – cross-linking mass spectrometry for proteomics
2016–	Prof. Janet Thornton (EMBL-EBI) – enzyme informatics
2016–	Prof. Daniel Khananshvili (Tel Aviv University) – functional electrostatics in sodium-calcium exchangers
2015–	Dr. Lucy Colwell (University of Cambridge) – computational biology of tRNAs and synthetases

SERVICE & LEADERSHIP

2015–2016	King's College Wine Committee
2014–2015	King's College Computing Committee
2012–2013	Organized the Physical Chemistry Tutorial Series – Stanford Chemistry Department
2011–2013	Safety Coordinator – Boxer Laboratory
2011	TA Trainer – Stanford Department of Chemistry
2010-2012	Board of Directors and Financial Committee – Hillel at Stanford

October 19, 2017