

# Tanja Cuk

## A. Education

Princeton University	Electrical Engineering, Engineering Physics, B.S.E.	2000
Stanford University	Applied Physics, Ph. D.	2007
UC Berkeley	Miller Postdoctoral Fellowship	2007-2010

## B. Appointments

Associate Professor of Chemistry 2017-  
Department of Chemistry, University of Colorado, Boulder

Assistant Professor of Chemistry 2010-2017  
Department of Chemistry, University of California, Berkeley

Faculty Scientist 2010-2017  
Chemical Sciences Division, Lawrence Berkeley National Laboratory

## C. Honors and Awards

1. Tau Beta Pi National Engineering Honor Society
2. Charles Ira Young Memorial Tablet and Medal for Senior Thesis, 2000
3. National Science Foundation Pre-doctoral Fellowship, 2000
4. Miller Postdoctoral Fellowship at UC Berkeley, 2007-2010
5. Air Force Young Investigator Program, 2012-2015
6. Bakar Fellow Program (UC Berkeley), 2012-2017
7. 10<sup>th</sup> International Conference on Chemical Kinetics, Chicago Plenary Lecture (May 2017)
8. International Society for Optics and Photonics(SPIE), Hot Topic Plenary Lecture (Aug 2017)
9. Scientific Advisory Board Member, ARC CBBC: National Research Center of the Netherlands (Current)
10. Council member—Department of Energy, Chemical Sciences, Geosciences & Biosciences Division

## D. Publications

*Independent Career, UC Berkeley (all in bold corresponding author)*

1. **T. Cuk**, “Forwarding Molecular Design of Heterogeneous Catalysts,” ACS Central (First Reactions), accepted.
2. X. Chen, D. Aschaffenburg, and **T. Cuk**, “Surface Hopping of Intermediates as a Reaction Coordinate Engineering Bond-Forming Transition States at an Electrode Surface”, under-review.
3. J. Raberg, C. V. Oversteeg, A. Ramos, S. Harris, J. Vatammatu, O. Borodin and **T. Cuk**, “A Vibrational Probe and Molecular Dynamics Simulations Capture the Electric Double Layer Composition in Li-ion Battery Electrolytes”, in-preparation.
4. D. Aschaffenburg, S. Choing, C.D. Pemmaraju, D. Prendergast, **H. Bluhm\***, and **T. Cuk\***, “The First Monolayer of Hydroxylation and Water Absorption on SrTiO<sub>3</sub> Surfaces: Experiment (AP-XPS) and Theory”, re-submission.
5. X. Chen\*, D. Aschaffenburg\*, and **T. Cuk**, “Faradaic O<sub>2</sub> Evolution from n-SrTiO<sub>3</sub> using Nano- and Femto-second Pulsed Light Excitation” *Chemical Communication (Emerging Investigators)* 2017, 53, 7254 (invited). (**Featured as HOT article**)

6. X. Chen, D. Aschaffenburg, and **T. Cuk**, "One-Electron Intermediates of Water Oxidation and the Role of Solvation in their Stability" *Journal of Materials Chemistry A* 2017, 5, 11410 (invited).
7. K. Pollock, H. Q. Doan, C. Stanton, and **T. Cuk**, "Detecting the Photo-excited Carrier Distribution across GaAs/Transition Metal Oxide Interfaces by Coherent Longitudinal Acoustic Phonons," *J. Phys. Chem. Lett.* 2017, 8, 922.
8. X. Chen, S. Choing, D. Aschaffenburg, C.D. Pemmaraju, D. Prendergast and **T. Cuk**, "The Formation Time of Ti-O• and Ti-O•-Ti Radicals at the n-SrTiO<sub>3</sub>/Aqueous Interface during Photo-catalytic Water Oxidation" *J. Am. Chem. Soc.*, 2017, 139, 1830 (**Cover Article & JACS Spotlight**)
9. C.H.M. van Oversteeg, H.Q. Doan, F.M.F. de Groot, and **T. Cuk**, "In-Situ X-ray Absorption Spectroscopy of Transition Metal Based Water Oxidation Catalysts" *Chemical Society Reviews* 2017, 46, 102.
10. B. Liu, R. Wang, E. Glass, C. Hill, T. Cuk, J. Okamoto, D. Huang, M. van Schooneveld, and F.M.F. de Groot, "Distorted tetrahedral Co(II) in K<sub>5</sub>H[CoW<sub>12</sub>O<sub>40</sub>]H<sub>2</sub>O probed by 2p3d resonant inelastic X-ray scattering" *Inorganic Chemistry* 2016, 55, 10152.
11. D.M. Herlihy, M.M. Waegele, X. Chen, C.D. Pemmaraju, D. Prendergast and **T. Cuk**, "Detecting the Oxyl Radical of Photocatalytic Water Oxidation by its Sub-Surface Vibration" *Nature Chemistry* 2016, 8, 549. (**Featured in News & Views 8, 527**)
12. H.Q. Doan, K.L. Pollock, and **T. Cuk**, "Transient Optical Diffraction of an n-GaN/Aqueous interface: interfacial carrier mobility dependent on surface reactivity" *Chemical Physics Letters (Frontiers)* 2016, 649, 1 (Invited). (**Cover Article**)
13. N. Tran, A. Singh and **T. Cuk**, "Highly Reversible Transition Metal Deposition and Oxidation on Symmetric RuO<sub>2</sub> Electrodes for Battery Applications" *J. of Electrochem. Soc.* 2015, 163, A286.
14. S.N. Choing, A.J. Francis, G. Clendenning, M.S. Schuurman, R.D. Sommer, I. Tambllyn, W.W. Weare, and **T. Cuk**, "Long-Lived LMCT in a d<sup>0</sup> Vanadium (V) Complex by Internal Conversion to a State of 3d<sub>xy</sub> Character" *J. Phys. Chem. C* **2015**, 119, 17029 (**Cover article**)
15. A.M. Hibberd, H.Q. Doan, E.N. Glass, F.M.F. de Groot, C.L. Hill, and **T. Cuk**, "Co Polyoxometalates and a Co<sub>3</sub>O<sub>4</sub> Thin Film Investigated by L-Edge X-ray Absorption Spectroscopy" *J. Phys. Chem. C* 2015, 119, 4173.
16. M.M. Waegele, X. Chen, D.M. Herlihy, and **T. Cuk**, "How Surface Potential Determines the Kinetics of the First Hole Transfer of Photo-catalytic Water Oxidation" *J. Am. Chem. Soc.* 2014, 136, 10632.
17. M. Waegele, H. Doan, and **T. Cuk**, "Long-lived photoexcited carrier dynamics of d-d excitations in spinel ordered Co<sub>3</sub>O<sub>4</sub>," *J. Phys. Chem. C.* 2014, 118, 3426.

*Postdoctoral training at UC Berkeley*

18. **T. Cuk**, W.W. Weare, and H. Frei, "Unusually long lifetime of excited charge transfer state in all inorganic, oxo-bridged binuclear units" *J. Phys. Chem. C.* 114, 9167 (2010)
19. H.Y. Liu, ..., **T. Cuk**, R. Merlin, and A. Cavalleri, "Possible observation of parametrically amplified coherent phasons in K<sub>0.3</sub>MoO<sub>3</sub> using time-resolved extreme-ultraviolet angle-resolved photoemission spectroscopy" *Phys. Rev. B.* 88, 045104 (2013).
20. C. R. Rotundu, **T. Cuk**, R. L. Greene, Z.-X. Shen, R. J. Hemley, and V.V. Struzhkin, "High-pressure resistivity technique for quasi-hydrostatic compression experiments," *Rev. Sci. Instrum.* 84, 063903 (2013).

*Graduate Studies at Stanford University*

21. **T. Cuk** *et al.*, “Signatures of pressure-induced superconductivity in insulating Bi2212,” *Phys. Rev. B.* 81, 184509 (2010)
22. **T. Cuk** *et al.*, “Uncovering a pressure-tuned electronic transition in Bi<sub>1.98</sub>Sr<sub>2.06</sub>Y<sub>0.68</sub>Cu<sub>2</sub>O<sub>8</sub> using Raman scattering and x-ray diffraction” *Phys. Rev. Lett.* 100, 217003 (2008)
23. X. J. Zhou, **T. Cuk**, T. Devereaux, N. Nagaosa, and Z.-X. Shen, “Angle-Resolved Photoemission Spectroscopy on Electronic Structure and Electron-Phonon Coupling in Cuprate Superconductors” *Treatise on High-Temperature Superconductivity*, edited by R. Schrieffer (2005-2006)
24. W. Meevasana, N.J.C. Ingle, D.H. Lu, J.R. Shi, F. Baumberger, K.M. Shen, W.S. Lee, **T. Cuk**, H. Eisaki, T.P. Devereaux, N. Nagaosa, J. Zaanen, and Z.-X. Shen "Doping dependence of the coupling of electrons to the bosonic modes in the single layer high-temperature Bi<sub>2</sub>Sr<sub>2</sub>CuO<sub>6</sub> superconductor" *Phys. Rev. Lett.* 96, 157003 (2006).
25. X. J. Zhou, Junren Shi, T. Yoshida, **T. Cuk**, W. L. Yang, V. Brouet, J. Nakamura, N. Mannella, Seiki Komiya, Yoichi Ando, F. Zhou, W. X. Ti, J. W. Xiong, Z. X. Zhao, T. Sasagawa, T. Kakeshita, H. Eisaki, S. Uchida, A. Fujimori, Zhenyu Zhang, E. W. Plummer, R. B. Laughlin, Z. Hussain, and Z.-X. Shen, “Multiple Bosonic Mode Coupling in the Electron Self-Energy of La<sub>2-x</sub>Sr<sub>x</sub>CuO<sub>4</sub>” *Phys. Rev. Lett.* 95, 117001 (2005).
26. **T. Cuk** *et al.*, “Coupling of the B<sub>1g</sub> Phonon to the Antinodal Electronic States of Bi<sub>2</sub>Sr<sub>2</sub>Ca<sub>0.92</sub>Y<sub>0.08</sub>Cu<sub>2</sub>O<sub>8</sub>” *Phys. Rev. Lett.* 93, 117003 (2004)
27. T.P. Devereaux, **T. Cuk**, Z.-X. Shen, and N. Nagaosa, “Anisotropic Electron-Phonon Interaction in the Cuprates” *Phys. Rev. Lett.* 93, 117004 (2004)
28. **T. Cuk**, D.H. Lu, X.J. Zhou, Z.-X. Shen, T.P. Devereaux, N. Nagaosa, “A review of electron-phonon coupling seen in the high-T<sub>c</sub> superconductors by angle-resolved photoemission studies (ARPES)” *Physica Status Solidi (b)* 242, 11 (2004) Cover Article.
29. **T. Cuk**, Z.-X. Shen, A. D. Gromko, Z. Sun, D. S. Dessau, “Copper oxide superconductors: Sharp-mode coupling in high-T<sub>c</sub> superconductors” *Nature* 432 Brief Communications (18 Nov 2004)

*Undergraduate Studies, Princeton University*

30. **T. Cuk**, S. M. Troian, C. M. Hong, S. Wagner, “Using convective flow splitting for the direct printing of fine copper lines” *Appl. Phys. Lett.* 77, 2063 (2000) (Work also appeared in “Direct Printing of Fine Copper Lines by Self-Organized Convective Flow”, *Materials Development for Direct Write Technologies*, Materials Research Society, Pittsburgh, PA, 624 p. 267 (2001))

**E. Invited Seminars and Conferences (40+)**

1. NIMS ICNSEE Seminar, Tsukuba, Japan (July 2010)
2. Physical Chemistry Seminar, UC Berkeley (Sept 2010)
3. American Chemical Sciences Meeting (242<sup>nd</sup>), Denver (Aug 2011)
4. American Chemical Sciences Meeting (246<sup>th</sup>), Indianapolis (Sept 2013)
5. Physical Chemistry Seminar, UC Berkeley (Sept 24 2013)
6. American Chemical Sciences Western Regional Meeting (Oct 2013)
7. Materials Research Society Meeting (Dec 2013)
8. From Solid State to Biophysics (June 2014)
9. NanoGe Solar to Fuel (June 2014)
10. International Coordination Chemistry Conference (Jul 2014)
11. SPIE Optics and Photonics Meeting (Aug 2014)

12. American Chemical Society Meeting (Sept 2014)
13. Nanotek Meeting (Dec 2014)
14. Physical Chemistry Seminar, Emory University (Feb 2015)
15. Physical Chemistry Seminar, Yale University (Feb 2015)
16. Physical Chemistry Seminar, Princeton University (Feb 2015)
17. Physical Chemistry Seminar, University of Colorado, Boulder (March 2015)
18. Physical Chemistry Seminar, Caltech University (March 2015)
19. ANSER Seminar, Northwestern University (April 2015)
20. Materials Research Society Symposium, San Francisco (April 2015)
21. Physics Seminar, Brown University (April 2015)
22. American Chemical Society (250<sup>th</sup>), Boston (Aug 2015)
23. Physical Chemistry Seminar, UC Berkeley (Sept 2015)
24. Gordon Research Conference on Renewable Energy Solar Fuels, Italy (Feb 2016)
25. Physical Chemistry Seminar, Georgia Tech (April 2016)
26. Physical Chemistry Seminar, University of Georgia (April 2016)
27. Physical Chemistry Seminar, University of Illinois Urbana-Champaign (May 2016)
28. Physical Chemistry Seminar, Indiana University (May 2016)
29. Gordon Research Conference on Molecular Interactions and Dynamics, Easton (July 2016)
30. Materials Research Society, Cancun, Mexico (August 2016)
31. Physical Chemistry Seminars: Princeton University, Cornell University, Pennsylvania State University, and University of Washington, St. Louis (Fall 2016)
32. Physical Chemistry Seminars: University of Colorado, Boulder and Indiana University (Spring 2017)
33. American Chemical Society Meeting Symposium, Spring (April 2017)
34. Dutch Institute for Fundamental Energy Research (DIFFER), Spring (April 2017)
35. 10<sup>th</sup> International Conference on Chemical Kinetics, Chicago Plenary Lecture (May 2017)
36. International Conference on Photochemistry, Strasbourg (July 2017)
37. SPIE Optics and Photonics, San Diego (Keynote + Hot-topic) (August 2017)
38. Penn Conference on Theoretical Chemistry (PCTC) (August 2017)
39. Materials & Molecules for Artificial Photosynthesis, Cancun (February 2018)
40. ARC/CBBC Consortium for the Netherlands, Utrecht (April 2018)
41. Gordon Research Conference on Vibrational Spectroscopy (August 2018)
42. Keynote at the 6<sup>th</sup> International Symposium of Solar Fuels and Solar Cells, Dalian China (October 2018)

**F1. Research Support (Single PI, Total Raised: \$2,310,000)**

1. Air Force Office of Scientific Research Young Investigator Program (\$360,000 over 3 years) (Finished, currently being reviewed for a regular AFOSR grant)
2. Department of Energy Condensed Phase and Interface Program (\$1,650,000 over 5 years) (Continued)
3. Bakar Fellowship (\$300,000 over 5 years) (Through June 2017)

**F2. Research Support (Collaborative Grants, PI Portion: \$250,000)**

4. Department of Energy NSET Program, Materials Science Division, “Inorganic-Organic Interfaces” (with T. Xu, P. Alivisatos, M. Salmeron, L.W. Wang, and Yi. Liu, Finished)

- National Science Foundation, Earth Sciences: Geobiology and Low Temp Geochemistry, “The mechanism of fumarate photoreduction on ZnS nanoparticles” (Total \$400,000 over 3 years, with B. Gilbert and J. Blanfield, Ended)

**F3. Current Research Support (Collaborative & Single PI, PI Portion: \$1.65 M)**

- Department of Energy Condensed Phase and Interfacial Molecular Science (CPIMS)/DOE (Single PI, \$706,516 over 3 years)
- Department of Energy, Materials Science Division (Co-PI on Collaborative Grant with Stanford Linear Accelerator Center, SLAC, \$300,000K to PI over 3 years)
- Renewable and Sustainable Energy Institute, Startup

**G. Current Research Group (2 Total)**

*Postdoctoral Scholars*

- Luca D’Amario (PhD, Uppsala University), 2018-

*Visiting Scientists*

- Elena Magnano (Elettra Beamline), 2018-2019

**H. Former Research Group (13 Total)**

*Graduate Students*

- Xihan Chen, PhD (UC Berkeley, 2012-2017), NREL Postdoctoral Fellow
- Hoang Doan, PhD (UC Berkeley, 2010-2016), Intel Research and Development
- Stephanie Choing, PhD (UC Berkeley, 2010-2016), Patent Law Firm
- Kevin Pollack, PhD (UC Berkeley, 2011-2016)
- David Herlihy, PhD (UC Berkeley, 2012-2016)
- Jonathan Radberg, M.S. (UC Berkeley, 2013-2015), PhD in Geology, CU Boulder
- Christa Van Oversteeg, M.S. (Visiting, March-Aug 2015), PhD Utrecht

*Postdoctoral Scholars*

- Daniel Aschaffenburg (UCB, 2015-2017), Coherent Research and Development
- Amber Hibberd (LBNL, 2012-2013), Intel Research and Development
- Matthias Waegle (UCB, 2011-2015), Assistant Professor of Chemistry at Boston College

*Undergraduate Students*

- Aayush Singh (UC Berkeley, 2012-2014)  
Currently a graduate student in Chemical Engineering at Stanford University.
- Nhu Tran (UC Berkeley, 2013-2015)  
Currently a graduate student in Chemistry at Princeton University.
- Axel Ramos (UC Berkeley, 2015-2016)

- I. Teaching:** Physical Chemistry (Quantum Mechanics, Junior Level), General Chemistry Honors (Freshman Level), General Chemistry (Freshman Level)

**University of California, Berkeley**

Semester/Year	Course Number/Course Title	Rank (of 7) / Dept Avg (Yearly)
Spring 2011	Chem 120A/Physical Chemistry	3.91/5.56
Fall 2011	Chem 120A/Physical Chemistry	4.92/5.38
Fall 2012	Chem 120A/Physical Chemistry	5.61/5.65
Spring 2014	Chem 120A/Physical Chemistry	5.69/5.48
Fall 2014	Chem 120A/Physical Chemistry	5.26/5.56
Fall 2015	Chem 4A/General Chemistry Honors	5.18/5.48

Fall 2016	Chem 4A/General Chemistry Honors	5.36/5.61
<b>University of Colorado, Boulder</b>		
<b>Semester/Year</b>	<b>Course Number/Course Title</b>	<b>Rank (of 6) / Dept Avg (Yearly)</b>
Spring 2018	Chem 1113/General Chemistry	

**J. Service:**

*Department, CU Boulder*

1. Committee for Graduate Admissions
2. Committee for Faculty Recruiting

*Department, UC Berkeley Campus, and Lawrence Berkeley Labs (LBNL)*

3. CSD Division Staff Committee on the hire of new career-track staff scientists (2015- )
4. Chemistry Departmental Committee for Graduate Life (2011-15)
5. Seminar Co-Chair for the Physical Chemistry Seminar Series (2012-2013)
6. Diversity and Inclusion Council Committee, CSD, LBNL (2013- present)
7. CSD Gas Phase and Condensed Phase Monthly Seminars (2012-2014)
8. Tours of the Advanced Light Source, LBNL
9. User Executive Committee of the Advanced Light Source, LBNL
10. Iota Sigma Pi Women in Chemistry: Social Events and Discussions
11. Panel Discussion on Applying to Graduate School
12. Speaker on Physics 300 Panel for Women and Minorities (11/2/2011)
13. Speaker at Miller Lunch Panel Discussion on Job Search Process (2/5/2013)
14. Amgen Scholar Lunch (several over the past years)

*Scientific Community*

15. Panelist for Basic Energy Sciences, Department of Energy Workshop *Basic Research Needs for Catalysis Science to Transform Energy Technologies* (May 8-10, 2017)
16. Panelist for Basic Energy Sciences, Department of Energy Workshop *Basic Research Needs for Future Nuclear Energy* (Aug 8-11, 2017)
17. Scientific Advisory Board Member, ARC CBBC: National Research Center of the Netherlands (2016- )
18. Linear Coherent Light Source (LCLS) Proposal Review Panel: Vice-Chair for the Chemical Sciences Division Subpanel (2012-2013 member, 2013-2015 Vice-Chair)
19. ACS 2014 Dallas Theme Committee: Chemistry and Materials for Energy (2013-2014)
20. Peer Reviewer for *J. Am. Chem. Soc.*, *Catalysis Letters*, *J. Phys. Chem. C.*, *Phys. Rev.*, & *Angewandte Chemie*
21. Proposal reviewer for NSF and DOE