# Biographical Sketch: Thomas W. Kirchstetter

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**(a) Professional Preparation**

Alexander Hollaender Distinguished Postdoctoral Fellow, LBNL, 1998 – 2000
Ph.D. Environmental Engineering, University of California at Berkeley, 1998
M.S. Environmental Engineering, University of California at Berkeley, 1994
B.S. Atmospheric Science and Mathematics, State University of New York at Albany, 1991

**(b) Current Appointments**

***Lawrence Berkeley National Laboratory***
Acting Director, Energy Analysis and Environmental Impacts Division, June 2017 – present
Department Head, Sustainable Energy and Environmental Systems Department, 2015 – present
Group Leader, Sustainable Energy Systems Group, 2015 – present
Staff Scientist, Lawrence Berkeley National Laboratory, 2000 – present

***University of California Berkeley***
Adjunct Associate Professor, Department of Civil and Environmental Engineering, 2011 – present

***Research interests****:* Air pollution science & technology: Emissions from renewable and clean energy technologies, with a focus on transportation, biomass combustion, and anaerobic digestion of municipal solid waste • Aerosol science: composition, climate-relevant optical properties, black and brown carbon • Aerosol measurement technologies: fabrication and evaluation of low-cost sensors; community air monitoring networks • Waste-to-energy, evaluation of benefits and barriers

***Course instruction:***
Air Quality Engineering (CE218A) Graduate level, Spring 2017, 2016
Air and Water Quality Laboratory (CE111L) Upper division, Spring 2016, 2015, 2014
Environmental Engineering (CE111) Upper division, Spring 2008, 2011, Fall 2012

**(c) Professional Service and Synergistic Activities**

Editor, Aerosol Science and Technology Journal, 2013 – present
Organizer, International Conference on Carbonaceous Particles in the Atmosphere, 2000 – present
Contributor, EPA's Integrated Science Assessment for particulate patter welfare effects – 2016
Editor, Journal of Atmospheric Chemistry and Physics, 2006 – 2013
Member, Distinguished Lecture Series Committee, Lawrence Berkeley National Lab, 2011 – 2013
Member, Bay Area AQMD's Community Air Risk Evaluation Task Force, 2008 – 2010
Panel Expert, Alameda Board of County Supervisors, Local Port Truckers' Panel Hearing, Aug 2011
Panel Reviewer, DOE Atmospheric Systems Research, Aerosol-climate proposals, Sep 2010
Reviewer, DOE SBIR Program, Low emission high efficiency biomass cookstove proposals, Mar 2012
Reviewer, Manuscripts for multiple peer-review journals including ES&T, GRL, JGR, ACP, Recurring

**(d) Honors**

R&D 100 Award Winner, Cool Roof Time Machine, 2016
Outstanding Urban Heat Island Group of Researchers Award, 2016
Outstanding Mentor Award, DOE, Office of Science Undergraduate Research Program, 2005
Research & Development Award, Lawrence Berkeley National Laboratory, 2011, 2007, 2002
Alexander Hollaender Distinguished Postdoctoral Fellowship, Department of Energy, 1998
Golden West Section Graduate Scholarship, Air & Waste Management Association, 1994
Science and Engineering Research Semester Award, Department of Energy, 1992

**(e) Student Mentoring**

*Postdoctoral associates:*
Dr. Chelsea Preble, Postdoctoral Associate, CEE (current)
Dr. Odelle Hadley, E.O. Lawrence Postdoctoral Fellow, LBNL, Jan 2009 – Dec 2011
Dr. Joshua Apte, ITRI-Rosenfeld Postdoctoral Fellow, LBNL, Jun 2013 – Dec 2014

*Ph.D. students*:
Chelsea Preble, NSF graduate research fellow (completed PhD in May 2017)
Julien Caubel, NSF graduate research fellow, ME (current)

*Ph.D. qualifying and preliminary exam committee member service:*
Regan Patterson (UCB, 2017)
Rebecca Wernis (UCB, 2016)
Ellen Gray (UCB, 2016)
Ivy Tao (UCB, 2013)
Brian McDonald (UCB, 2011)
Yanju Chen (U. Illinois, 2011)
Tim Dallmann (UCB, 2011)
Gavin McMeeking (Col. State, 2008)

*Undergraduate students mentored via CE199, H194, ESPM H175L, or research appointment:*
CEE: Annie Rosen, Kelly Archer, Carter Keeling, Chloe Cheok, Sean Dasey, Chelsea Preble, Nick Tang
Chem Eng: Yannick Johnson, Brandon Yee
ESPM: Shannon Chang

**(f) Peer-Reviewed Publications**

(Google Scholar h-index = 40, citations = 6670; Web of Knowledge h-index = 35, citations = 4300)

72. Apte, JS; Messier, KP; Gani, S; Brauer, M; Kirchstetter, TW; Lunden, MM; Marshall, JD; Portier, CJ; Vermeulen, RCH; Hamburg, SP (2017) High-resolution air pollution mapping with Google Street View cars: exploiting big data, *Environ. Sci. Technol*., doi: 10.1021/acs.est.7b00891

71. Kirchstetter, TW; Preble, CV; Hadley, OL; Bond, TC; Apte, JS (2017) Large reductions in urban black carbon concentrations in the United States between 1965 and 2000, Atmos. Environ., 151, 17-23, doi:10.1016/j.atmosenv 2016.11.001

70. Berdahl P, Chen SS, Destaillats H, Kirchstetter TW, Levinson RM, Zalich MA (2016) Fluorescent cooling of objects exposed to sunlight – The ruby example. Solar Energy Materials & Solar Cells, doi:10.1016/j.solmat.2016.05.058

69. Sleiman, M; Chen, S; Gilbert, HE; Kirchstetter, TW; Berdahl, P, et al (2015) Soiling of building envelope surfaces and its effect on solar reflectance - Part III: Interlaboratory study of an accelerated aging method for roofing materials, SOLMAT, 143, 581-590, doi:10.1016/j.solmat.2015.07.031

68. Preble, CV, Dallmann, TR; Kreisberg, NM; Hering, SV; Harley, RA; Kirchstetter, TW (2015) Effects of particle filters and selective catalytic reduction on heavy-duty diesel drayage truck emissions at the Port of Oakland, *Environ. Sci. Technol*., doi:10.1021/acs.est.5b01117

67. Tang, NW; Apte, JS; Martien, PT; Kirchstetter, TW (2015) Measurement of black carbon emissions from in-use diesel-electric passenger locomotives in California, *Atmos. Environ., 115*, 295-303, doi:10.1016/j.atmosenv.2015.05.001

66. Browne, EC; Franklin, JP; Canagaratna, MR; Massoli, P; Kirchstetter, TW; Worsnop, DR; Wilson, KR; Kroll, JH (2015) Changes to the Chemical Composition of Soot from Heterogeneous Oxidation Reactions, *J. Physical Chem. A, 119,* 1154-1163, doi: 10.1021/jp511507d.

65. Canagaratna, MR; Massoli, P; Browne, EC; Franklin, JP; Wilson, KR; Onasch, TB; Kirchstetter, TW; Fortner, EC; Kolb, CE; Jayne, JT; Kroll, JH; Worsnop, DR (2015) Chemical Compositions of Black Carbon Particle Cores and Coatings via Soot Particle Aerosol Mass Spectrometry with Photoionization and Electron Ionization, *J. Physical Chem. A, 119,* 4589-4599, doi:10.1021/jp510711u.

64. Preble, CV; Hadley, OL; Gadgil, AJ; Kirchstetter, TW (2014) Emissions and climate-relevant optical properties of pollutants emitted from a Three-Stone Fire and the Berkeley-Darfur Stove tested under laboratory conditions, *Environ. Sci. Technol.,* doi:10.1021/es5002715.

63. Dallmann, TR; Onasch, TB; Kirchstetter, TW; Worton, DR; Fortner, EC; Herndon, SC; Wood, EC; Franklin, JP; Worsnop, DR; Goldstein, AH; Harley, RA (2014) Characterization of particulate matter emissions from on-road gasoline and diesel vehicles using a soot particle aerosol mass spectrometer, *Atmos. Chem. Phy. Discuss*, doi: 10.5194/acpd-14-4007-2014.

62. Thatcher, TL; Kirchstetter, TW; Malejan, CJ; Ward, CE (2014) Infiltration of black carbon particles from residential woodsmoke into nearby homes, *Open J. Air Poll., 3,* doi:10.4236/ojap.2014.34011.

61. Thatcher, TL; Kirchstetter, TW; Tan, SH; Malejan, CJ; Ward, CE (2014) Near-field variability of residential woodsmoke concentrations, *Atmos. Climate Sci., 4,* doi: 10.4236/acs.2014.44055.

60. Worton, DR; Isaacman, G; Gentner, DR; Dallmann, TR; Chan, AWH; Ruehl, CR; Kirchstetter, TW; Wilson, KR; Harley, RA; Goldstein, AH (2014) Lubricating oil dominates primary organic aerosol emissions from motor vehicles, *Environ. Sci. Technol.,* doi:10.1021/es405375j.

59. Wang, Y; Sohn, MD; Wang, Y; Lask, KM; Kirchstetter, TW; Gadgil, AJ (2014) How many replicate tests are needed to test cookstove performance and emissions? – Three is not adequate, *Energy for Sustainable Development, 20*, 21–29, doi:10.1016/j.esd.2014.02.002.

58. Sleiman, M; Kirchstetter, TW; Berdahl, P; Gilbert, HE; Quelen, S; Marlot, L; Preble, C; Chen, S; Montalbano, A; Rosseler, O; Akbari, H; Levinson, R; Destaillats, H (2014) Soiling of building envelope surfaces and its effect on solar reflectance - Part II: Development of an accelerated aging method for roofing materials, *SOLMAT, 122*, 271-281, doi:10.1016/j.solmat.2013.11.028.

57. Dallmann, TR; Kirchstetter, TW; DeMartini, SJ; Harley, RA (2013) Quantifying on-road emissions from gasoline-powered motor vehicles: accounting for the presence of medium and heavy-duty diesel trucks, *Environ. Sci. Technol., 47*, 13873-13881, doi:10.1021/es402875u

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55. Chan, AWH; Isaacman, G; Wilson, KR; Worton, DR; Ruehl, CR; Nah, T; Gentner, DR; Dallmann, TR; Kirchstetter, TW; et al. (2013) Detailed chemical characterization of unresolved complex mixtures in atmospheric organics: Insights into emission sources, atmospheric processing, and secondary organic aerosol formation, *J. Geophys. Res. Atmos., 118*, doi:10.1002/jgrd.50533.

54. Hadley, OL; Kirchstetter, TW (2012) Black carbon snow albedo reduction, *Nature Climate Change*, *2*, 437-440, doi: 10.1038/NCLIMATE1433.

53. Dallmann, TR; DeMartini, SJ; Kirchstetter, TW; Herndon, SC; Onasch, TB; Wood, EC; Harley, RA (2012) On-Road Measurement of Gas and Particle Phase Pollutant Emission Factors for Individual Heavy-Duty Diesel Trucks, *Environ. Sci. Technol*., *46,* 8511-8518, doi:10.1021/es301936c.

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50. Gadgil, A. J., Fridley, D, Zheng, N, Sosler, A, Kirchstetter, T, and Phadke, A, Energy in the Developing World (2011) Book chapter in *Physics of Sustainable Energy II: Using Energy Efficiency and Producing it Renewably*, Hafemeister, D., Kammen, D., Levi, B., and Schwartz, P., Eds. Published by American Institute of Physics, AIP Conf. Proc. 1401, Melville, NY, 2011. Pp. 54-74. doi: 10.1063/1.3653845.

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49. Dallmann, TR; Harley, RA; Kirchstetter, TW (2011) Effects of diesel particle filter retrofits and accelerated fleet turnover on drayage truck emissions at the port of Oakland, *Environ. Sci. Technol.*, *45*, 10773–10779.

48. Sleiman, M; Ban-Weiss, G; Gilbert, HE; Francois, D; Berdahl, P; Kirchstetter, TW; Destaillats, H; Levinson, R (2011) Soiling of building envelope surfaces and its effect on solar reflectance – Part 1: Analysis of roofing product databases, *Sol. Energ. Mat. Sol. Cells*, *95*, 3385-3399, doi:10.1016/j.solmat.2011.08.002.

47. Apte, JS; Kirchstetter, TW; Reich, AH; Deshpande, SJ; Kaushik, G; Chel, A; Marshall, JD; Nazaroff, WW (2011) Concentrations of fine, ultrafine, and black carbon particles in auto-rickshaws in New Delhi, India, *Atmos. Environ.*, *45,* 4770-4480.

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44. Strawa, AW; Kirchstetter, TW; Hallar, AG; Ban-Weiss, GA; McLaughlin, JP; Harley, RA; Lunden, MM (2009) Optical and physical properties of primary on-road vehicle particle emissions and their implications for climate change, *J. Aerosol Sci., 41,* 36-50.

43. Strawa, AW; Kirchstetter, TW; Puxbaum, (2010) Special issue for the 9th international conference on carbonaceous particles in the atmosphere, *J. Aerosol Sci., 41,* 1-4.

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41. Ban-Weiss, GA; Lunden, MM; Kirchstetter, TW; Harley, RA (2009) Size-resolved particle number and volume emission factors for on-road gasoline and diesel motor vehicles, *J. Aerosol Sci., 41,* 5-12.

40. Ban-Weiss, G; Lunden, MM; Kirchstetter, TW; Harley, RA (2009) Measurement of black carbon and particle number emission factors from individual heavy-duty trucks, *Environ. Sci. Technol., 43*, 1419–1424.

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34. Hadley, OL; Corrigan, CE; Kirchstetter, TW. (2008) Modified thermal-optical analysis using spectral absorption selectivity to distinguish black carbon from pyrolized organic carbon, *Environ. Sci. Technol., 42*, 8459–8464.

33. Lunden, MM, Kirchstetter, TW, Thatcher, TL, Hering, SV, and Brown, NJ. (2008) Factors affecting the indoor concentration of carbonaceous aerosols of outdoor origin. *Atmos. Environ*., *42***,** 5660-5671.

32. Ban-Weiss, GA; McLaughlin, JP; Harley, RA; Lunden, MM; Kirchstetter, TW; Kean, AJ; Strawa, AW; Stevenson, ED; Kendall, GR. (2008) Long-term changes in emissions of nitrogen oxides and particulate matter from on-road gasoline and diesel vehicles, *Atmos. Environ., 42,* 220-232.

31. Kirchstetter, T.W.; Novakov, T. (2007) Controlled generation of black carbon particles from a diffusion flame and applications in evaluating black carbon measurement methods. *Atmos. Environ*., *41*, 1874-1888, doi:10.1016/j.atmosenv.2006.10.067.

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29. Jimenez, J; Claiborn, C; Larson, T; Gould, T; Kirchstetter, TW; Gundel, L (2007) Loading effect correction for real-time aethalometer measurements of fresh diesel soot, *J. Air Waste Manage.,57,* 868-873.

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27. Harley, RA; Hooper, DS; Kean, AJ; Kirchstetter, TW; et al. (2006) Effects of reformulated gasoline and motor vehicle fleet turnover on emissions and ambient concentrations of benzene, *Environ. Sci. Technol*., *40*, 5084-5088, doi:10.1021/es0604820.

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24. Kirchstetter, TW; Novakov, T; Hobbs, PV. (2004) Evidence that spectral light absorption by aerosols emitted from biomass burning and motor vehicles is different due to organic carbon. *J. Geophys. Res., 109*, D21208, doi:10.1029/2004JD004999.

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aerosol formation and some applications to the marine boundary layer. *J. Geophys. Res.*, *106*, 27619-27634.

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