

PHILIP M. FINE

Home: 1557 Topanga Skyline Dr.
Topanga, CA 90290
310 455 7733

Office: Dept. of Civil and Environ. Engineering
University of Southern California, KAP-210
3620 South Vermont Avenue
Los Angeles, CA 90089
213 740 0560
pmfine@usc.edu

EDUCATION

California Institute of Technology, Pasadena, California

Ph.D., Environmental Engineering Science, January 2002

Masters of Science, June 1997

Minor in Art History

Cumulative GPA: 3.9

Doctoral Thesis: *The Contribution of Biomass Combustion to Ambient Fine Particle Concentrations in the United States*

Advisor: Dr. Glen R. Cass (Deceased)

University of California, Berkeley, California

B.S., Mechanical Engineering/Materials Science and Engineering, with Highest Honors, May 1993

Cumulative GPA: 3.9

Minor in Classical Civilization

Mary C. and William G. Drake Scholarship

RESEARCH EXPERIENCE

University of Southern California, Los Angeles, California

2002 - present

As *Research Assistant Professor*, analyzed data from a novel size-fractionated continuous fine particle nitrate monitor and prepared results for publication. Designed and conducted a study to measure individual primary and secondary organic compounds present in ambient ultrafine particles on short time scales and at different Southern California sampling sites. Analyzed data from on-going Southern California Supersite project and supervised the preparation of numerous manuscripts accepted for publication. Continued the development and testing of an electrostatic filter designed for the control of ultrafine particle emissions from major sources. Began the development of a low-cost beta attenuation monitor (BAM) for the semi-continuous measurement of ambient particulate matter designed for community-based monitoring and exposure assessment.

Designed, built and tested improved fine particle concentration systems for use in ambient sampling, in vitro and in vivo health exposure studies. Provided support for health effects investigators by collecting ambient particulate matter samples for subsequent toxicity assays. Successfully managed an extensive sampling campaign in Mexico City to collect particle samples for in vitro toxicity testing. Evaluated a personal continuous particle monitor for use in future epidemiological panel studies. Initiated the development of a multi-purpose fully automated particle concentrator that will be deployed for the unattended collection of in vitro samples and used to increase the sensitivity of current particle mass spectrometry technologies.

Prepared or assisted in the preparation of several funding proposals, including a recently awarded collaborative NIH study on the size- and chemically-resolved personal exposure to particulate matter and the associated health effects. Supervised several graduate students and technicians on numerous research projects. Served on several Ph.D. thesis proposal and defense committees.

California Institute of Technology, Pasadena, California**1995 – 2002**

As *Graduate Student Researcher*, designed, planned, and conducted emissions testing experiments to fully characterize the fine particle emissions from a variety of biomass combustion sources including fireplaces and wood stoves. Analyzed fine particle samples for chemical composition using several advanced analytical techniques including gas chromatography/mass spectrometry (GC/MS). Used chemical mass balance receptor modeling to determine the contribution of biomass combustion to ambient fine particle levels throughout the United States.

Prepared a research grant application to the U.S. EPA resulting in complete funding for doctoral thesis research.

Performed additional emissions testing to aid in the assessment of the effects of indoor candle burning on the soiling of interior surfaces within historical churches. Participated in several field sampling campaigns, including both indoor and outdoor air quality studies. Provided technical support and maintenance for GC/MS instrumentation.

Lawrence Berkeley Laboratory, Berkeley, California**1991 – 1993**

Engaged in various team and individual research projects for the design and manufacture of semiconductor radiation detectors. Performed chemical and mechanical processing of semiconductor devices. Presented research results in oral and written summary reports.

INDUSTRY EXPERIENCE**Pacific Environmental Services, Inc., Baldwin Park, California****1994 – 1995**

As *Environmental Engineering Consultant*, performed numerous air emissions compliance tests for industrial clients using EPA methodology. Compiled air emissions inventories for government installations via extensive record review and personnel interviews. Prepared Title V permit applications for a variety of industrial sources. Produced written reports for submission to state and local regulatory agencies, including a complete Storm Water Pollution Prevention Plan for a local U. S. Air Force base.

EDUCATIONAL EXPERIENCE**University of Southern California, Los Angeles, California****2004 – 2005**

As *Research Assistant Professor*, taught graduate level courses in “Environmental Pollution: Monitoring and Risk Assessment” and “Air Pollution Fundamentals.”

Caltech Pre-College Science Initiative, Pasadena, California**1999 – 2001**

As a *Curriculum Developer*, designed inquiry-based science curricula for Pasadena high schools on the subject of the global carbon cycle and climate change. Prepared instructional materials and teaching manuals as part of a team comprised of scientists and high school teachers.

California Science Fair, Los Angeles, California**1998 – present**

As *Category Chairperson*, supervised a team of judges in the environmental engineering category. As *Category Judge*, judged student projects in both the junior and senior divisions. Served on the Abstract Review Committee in 2000 and 2001. Served on the Judges Action Committee in 2004 and 2005.

California Institute of Technology, Pasadena, California**1997 – 1998**

As *Teaching Assistant*, provided student assistance, corrected homework assignments, and lectured in professor’s absence for an undergraduate heat transfer course and a graduate-level air pollution course.

University of California, Berkeley, California**1991 – 1992**

Worked as a volunteer *Student Tutor* for the Honor Students’ Society

PROFESSIONAL AFFILIATIONS/SERVICE

Member of the American Association for Aerosol Research - Session Chairperson, AAAR 2000, 2001, 2004 conferences

Member of the American Chemical Society

External Scientific Advisory Committee, MESA Air Study, University of Washington, 2005

NSF Workshop – Emerging Issues in Nanoparticle Aerosol Science and Technology - contributing author to the final report, 2003

EPA STAR Grant Program – Peer Review Panels, 2003, 2004

Reviewed numerous manuscripts for several scientific journals, including *Aerosol Science & Technology*, *Environmental Science & Technology*, *Atmospheric Environment*, *Journal of the Air and Waste Management Association*, *Journal of Geophysical Research*, and *Journal of Exposure Analysis and Environmental Epidemiology*

Reviewed research proposals for National Science Foundation, Natural Environment Research Council (UK), and University of Singapore

RESEARCH GRANTS

Principal Investigator, “A Simple, Low-Cost Beta Attenuation Monitor (BAM) for Continuous Measurement of PM₁₀, PM_{2.5} or Ultrafine Particle Concentrations.”

\$143,830, June 2003 – June 2005

Innovative Clean Air Technology Program, California Air Resources Board.

Co-principal Investigator, (Henry P.I., USC) “New Technologies for Source Apportionment”

\$450,000, February 2005 – January 2008

Environmental Protection Agency, National Center for Environmental Research STAR Program.

Co-principal Investigator, (Sioutas P.I., USC) “An Automated Aerosol Concentration System for the Collection of Suspended Particulate Matter in Aqueous Solutions Suitable for Toxicological Assays.”

\$214,195, December 2003 – November 2005

Asthma Consortium, South Coast Air Quality Management District.

Investigator, (Delfino P.I., UC Irvine) “Ultrafine PM and Cardiorespiratory Health”

\$2,817,789 (USC School of Engineering Share: \$715,000), December 2003 – November 2008

National Institute of Environmental Health Sciences (NIEHS-NIH).

PUBLICATIONS

Geller, M. D.; Biswas, S.; **Fine, P. M.**; Sioutas, C. “A New Compact Aerosol Concentrator for Use in Conjunction with Low Flow-Rate Continuous Aerosol Instrumentation.” *Journal of Aerosol Science*, **36**, 1006-1022, 2005.

Miguel, A. H.; Eiguren-Fernandez, A.; Sioutas, C.; **Fine, P. M.**; Geller, M.; Mayo, P. R. “Observations of Twelve US EPA Priority Polycyclic Aromatic Hydrocarbons In the Aitken Size Range (10-32nm Dp).” *Aerosol Science and Technology*, **39**, 415-418, 2005.

Biswas, S.; **Fine, P. M.**; Geller, M. D.; Hering, S. V.; Sioutas, C. “Performance Evaluation of a Recently Developed Water-Based Condensation Particle Counter.” *Aerosol Science and Technology*, **39**, 419-427, 2005.

Westerdahl, D.; Fruin, S.; Sax, T.; **Fine, P. M.**; Sioutas, C. “A Mobile Platform Approach to Measuring Ultrafine Particles and Associated Pollutant Concentrations on Freeways and Residential Streets in Los Angeles.” *Atmospheric Environment*, **39**, 3597-3610, 2005.

Khlystov, A.; Zhang, O.; Jimenez, J.-L.; Stanier, C.; Pandis, S. N.; Canagaratna, M. R.; **Fine, P.**; Misra, C.; Sioutas, C. “In-Situ Concentration of Semi-volatile Aerosol Using Water-Condensation Technology.” *Journal of Aerosol Science*, **36**, 866-880, 2005.

Kuhn, T.; Biswas, S.; **Fine P. M.**; Geller, M. G.; Sioutas, C. “Physical and Chemical Characteristics and Volatility of PM in the Proximity of a Light-Duty Vehicle Freeway.” *Aerosol Science and Technology*, **39**, 347-357, 2005.

Kuhn, T.; Krudysz, M.; Zhu, Y.; **Fine, P. M.**; Hinds, W. C.; Froines, J.; Sioutas, C. “Volatility of Indoor and Outdoor Ultrafine Particulate Matter Near a Freeway.” *Journal of Aerosol Science*, **36**, 291-302, 2005.

Zhao, Y.; Bein, K. J.; Wexler, A. S.; Misra, C.; **Fine, P. M.**; Sioutas, C. “Field Evaluation of the Versatile Aerosol Concentration Enrichment System (VACES) particle concentrator Coupled to the Rapid Single-Particle Mass Spectrometer (RSMS-3).” *Journal of Geophysical Research - Atmospheres*, **110** (D07), D07S02, 2005.

Phuleria, H. C.; **Fine, P. M.**; Zhu, Y.; Sioutas, C. “Air Quality Impacts of the October 2003 Southern California Wildfires.” *Journal of Geophysical Research - Atmospheres*, **110** (D07), D07S20, 2005.

- Sardar, S. B.; **Fine, P. M.**; Mayo, P. R.; Sioutas, C. "Size-Fractionated Measurements of Ambient Ultrafine Particle Chemical Composition in Los Angeles Using the NanoMOUDI." *Environmental Science and Technology*, **39**, 932-944, 2005.
- Sardar, S. B.; **Fine, P. M.**; Sioutas, C. "Seasonal and Spatial Variability of the Size-Resolved Chemical Composition of Particulate Matter (PM₁₀) in the Los Angeles Basin." *Journal of Geophysical Research - Atmospheres*, **110** (D07), D07S08, 2005.
- Fine, P. M.**; Cass, G. R.; Simoneit B. R. T. "Chemical Characterization of Fine Particle Emissions from the Wood Stove Combustion of Prevalent United States Tree Species." *Environmental Engineering Science*, **21** (6), 705-721, 2004.
- Geller, M. D.; **Fine, P. M.**; Sioutas, C. "The Relationship between Real-time and Time-integrated Coarse (2.5 – 10 µm), Intermodal (1 – 2.5 µm), and Fine (< 2.5 µm) Particulate Matter in the Los Angeles Basin." *The Journal of the Air and Waste Management Association*, **54**, 1029-1039, 2004.
- Hering, S.; **Fine, P. M.**; Sioutas C.; Jaques, P. A.; Ambs, J. L.; Hogrefe, O.; Demerjian, K. L. "Field Assessment of the Dynamics of Particulate Nitrate Vaporization Using Differential TEOM[®] and Automated Nitrate Monitors." *Atmospheric Environment*, **38**, 5183-5192, 2004.
- Sardar, S. B.; **Fine, P. M.**; Hoon, A.; Sioutas, C. "Associations Between Particle Number and Gaseous Co-Pollutant Concentrations in the Los Angeles Basin." *The Journal of the Air and Waste Management Association*, **54**, 992-1005, 2004.
- Chakrabarti, B.; **Fine, P. M.**; Delfino, R; Sioutas, C. "Performance Evaluation of an active personal DataRAM PM_{2.5} mass monitor (Thermo Anderson pDR-1200) designed for continuous personal exposure measurements." *Atmospheric Environment*, **38**, 3329-3340, 2004.
- Fine, P. M.**; Shen, S.; Sioutas, C.; "Inferring the Sources of Fine and Ultrafine Particulate Matter at Downwind Receptor Sites in the Los Angeles Basin Using Multiple Continuous Measurements." *Aerosol Science and Technology*, **38** (Supplement 1), 182-195, 2004.
- Fine, P. M.**; Cass, G. R.; Simoneit B. R. T. "Chemical Characterization of Fine Particle Emissions from the Fireplace Combustion of Wood Types Grown in the Midwestern and Western United States." *Environmental Engineering Science*, **21** (3), 387-409, 2004.
- Fine, P. M.**; Chakrabarti, B.; Krudysz, M.; Schauer, J. J.; Sioutas, C. "Diurnal Variations of Individual Organic Compound Constituents of Ultrafine and Accumulation Mode PM in the Los Angeles Basin." *Environmental Science and Technology*, **38** (5), 1296-1304, 2004.
- Misra, C.; **Fine, P. M.**; Singh, M; Sioutas, C. "Development and Evaluation of a Compact Facility for Exposing Humans to Concentrated Ambient Ultrafine Particles." *Aerosol Science and Technology*, **38**, 27-35, 2004.
- Fine, P. M.**; Jaques, P. A.; Hering, S. V.; Sioutas, C. "Performance Evaluation and Use of a Continuous Monitor for Measuring Size-Fractionated PM_{2.5} Particulate Nitrate." *Aerosol Science and Technology*, **37**, 342-354, 2003.
- Fine, P. M.**; Cass, G. R.; Simoneit, B. R. T. "Organic Compounds in Biomass Smoke from Residential Wood Combustion: Emissions Characterization at a Continental Scale." *Journal of Geophysical Research - Atmospheres*, **107** (D21), ICC-11, 2002.
- Fine, P. M.**; Cass, G. R.; Simoneit, B. R. T. "Chemical Characterization of Fine Particle Emissions from the Fireplace Combustion of Woods Grown in the Southern United States." *Environmental Science and Technology*, **36** (7), 1442-1451, 2002.
- Tesfaigzi, Y.; Singh, S.; Foster, J. E.; Kubatko, J.; Barr, E. B.; **Fine, P. M.**; McDonald, J. D.; Hahn, F. F.; Mauderly, J. L. "Health Effects of Subchronic Exposure to Low Levels of Wood Smoke in Rats." *Toxicological Sciences*, **65** (1), 155-125, 2002.
- Fine, P. M.**; Cass, G. R.; Simoneit, B. R. T. "Chemical Characterization of Fine Particle Emissions from the Fireplace Combustion of Woods Grown in the Northeastern United States." *Environmental Science and Technology*, **35** (13), 2665-2675, 2001.
- Fine, P. M.**; Cass, G. R.; Simoneit, B. R. T. "Characterization of Fine Particle Emissions from Burning Church Candles." *Environmental Science and Technology*, **33** (14), 2352-2362, 1999.

Derhacobian, N.; **Fine, P.**; Walton, J. T.; Wong, Y. K.; Rossington, C. S.; Luke, P. N. "Determination of Surface Recombination Velocity and Bulk Lifetime in Detector-Grade Silicon and Germanium Crystals." *IEEE Transactions on Nuclear Science*, **41** (4), 1026-1030, 1994.

Rossington, C. S.; **Fine, P. M.**; Madden, N. W. "Large-Area, Low Capacitance Si(Li) Detectors for High-Rate X-ray Applications." *IEEE Transactions on Nuclear Science*, **40** (4), 354-359, 1993.

Hays, M. D.; **Fine, P. M.**; Geron, C. D.; Kleeman, M. J.; Gullett, B. K. "Open Burning of Agricultural Biomass: Physical and Chemical Properties of Particle-Phase Emissions." Accepted by *Atmospheric Environment*, August, 2005.

Staimer, N.; Delfino, R. J.; Bufalino, C.; **Fine, P. M.**; Sioutas, C.; Kleinman, M. T. "A Miniaturized Active Sampler for the Assessment of Personal Exposure to Nitrogen Dioxide." Accepted by *Analytical and Bioanalytical Chemistry*, August, 2005.

Geller, M. D.; Sardar, S. B.; Phuleria, H.; **Fine, P. M.**; Sioutas, C. "Measurements of Particle Number and Mass Concentrations and Size Distributions in a Tunnel Environment." Accepted by *Environmental Science and Technology*, August, 2005.

De Vizcaya-Ruiz, A.; Gutiérrez-Castillo, M. E.; Uribe-Hernández, M.; Cebrián, M. E.; Mugica-Alvarez, V.; Sepúlveda, J.; Rosas, I.; Salinas, E.; Garcia-Cuéllar, C.; Martínez, F.; Alfaro-Moreno, E.; Torres-Flores, V.; Osornio-Vargas, A.; Sioutas, C.; **Fine, P. M.**; Singh, M.; Geller, M. D.; Kuhn, T.; Eiguren-Fernandez, A.; Miguel, A.; Schiestl, R.; Reliene, R.; Froines, J. "Characterization and In Vitro Biological Effects of Concentrated Particulate Matter from Mexico City." Submitted to *Atmospheric Environment*, May, 2005

Arhami, M.; Kuhn, T.; **Fine, P. M.**; Delfino, R. J.; Sioutas, C. "Effects of Sampling Artifacts and Operating Parameters on the Performance of a Semi-continuous Particulate EC/OC Monitor." Submitted to *Environmental Science and Technology*, June, 2005.

Majestic, B. J.; Schauer, J. J.; Shafer, M. M.; **Fine, P. M.**; Singh, M.; Sioutas, C. "Trace Metal Analysis of Atmospheric Particulate Matter: A Comparison of Personal and Ambient Samplers." Submitted to *Journal of Exposure Analysis and Environmental Epidemiology*, October, 2005.

Majestic, B. J.; Schauer, J. J.; Shafer, M. M.; Turner, J.; **Fine, P. M.**; Singh, M.; Sioutas, C. "Development of a Wet Chemical Method for the Speciation of Iron in Atmospheric Aerosols." Submitted to *Environmental Science and Technology*, October, 2005.

Phuleria, H. C.; Geller, M. D.; **Fine, P. M.**; Sioutas, C. "Size-Resolved Emissions of Organic Tracers from Light- and Heavy-Duty Vehicles Measured in a California Roadway Tunnel" Submitted to *Environmental Science and Technology*, November, 2005.

SELECTED PRESENTATIONS

"Update on Ultrafines." Invited Speaker, California Industrial Hygiene Council 14th Annual Conference, December 2, 2004, Redondo Beach, California.

"A New Aerosol mini-Concentrator for Use in Conjunction with Low Flow-rate Continuous Aerosol Instrumentation." Platform Presentation, 2004 American Association for Aerosol Research Conference, October 4-8, 2004, Atlanta, Georgia.

"Organic Compound Tracers of Primary and Secondary Sources of Fine and Ultrafine PM in the Los Angeles Basin." Platform Presentation, 2003 American Association for Aerosol Research Conference, October 20-24, 2003, Anaheim, California.

"The Contribution of Biomass Combustion to Ambient Fine Particle Concentrations in the United States." Invited Speaker, U.S.E.P.A. Region 9 STAR Environmental Research Seminar, October 8-9, 2003, San Francisco, California.

"Seasonal, Spatial, and Diurnal Variations of Individual Organic Compound Constituents of Ultrafine and PM_{2.5} in the Los Angeles Basin." Poster Presentation, 2003 American Association for Aerosol Research Fourth Colloquium on PM and Human Health, March 31-April 4, 2003, Pittsburgh, Pennsylvania.

"Performance Evaluation and Use of a Continuous Monitor for Measuring Size-Fractionated PM_{2.5} Nitrate." Platform Presentation, 2002 American Association for Aerosol Research Conference, October 7-11, 2002, Charlotte, North Carolina.

“The Contribution of Biomass Combustion to Ambient Fine Particle Concentrations throughout the United States.” Platform Presentation, 2001 American Association for Aerosol Research Conference, October 15-19, 2001, Portland, Oregon.

“Organic Compounds in Biomass Smoke from Residential Wood Combustion: Emissions Characterization at a Continental Scale.” Platform Presentation, Seventh International Conference on Carbonaceous Particles in the Atmosphere, November 26-29, 2000, San Juan, Puerto Rico.

“Organic Compounds in the Fine Particle Emissions from the Combustion of North American Wood Species in Wood Stoves.” Platform Presentation, 2000 American Association for Aerosol Research Conference, November 6-10, St. Louis, Missouri.

“Fine Particle Emissions from the Fireplace Combustion of a Variety of North American Wood Species.” Platform Presentation, 1999 American Association for Aerosol Research Conference, October 11-15, Tacoma, Washington.

“Composition and Size Distribution of Particulate Emissions from Burning Church Candles.” Platform Presentation, 1997 American Association for Aerosol Research Conference, October 13-17, Denver, Colorado.

PROFESSIONAL REFERENCES

Professor Constantinos Sioutas
Department of Civil and Environmental Engineering
University of Southern California, KAP-210
3620 South Vermont Ave.
Los Angeles, CA 90089
Telephone: 213 740 6134
e-mail: sioutas@usc.edu

Professor John R. Froines
Director, Southern California Particle Center and Supersite
School of Public Health, 56-070
University of California, Los Angeles
Los Angeles, CA 90095-1772
Telephone: 310 206 6141
e-mail: jfroines@ucla.edu

Professor Bernd R. T. Simoneit
College of Oceanic & Atmospheric
Sciences
Oregon State University
104 Ocean Administration Building
Corvallis, OR 97331-5503
Telephone: 541 737 2155
e-mail: simoneit@oce.orst.edu

Professor James J. Schauer
Department of Civil and Environmental Engineering
University of Wisconsin - Madison
660 North Park Street
Madison, WI 53706
Telephone: 608 262 4495
e-mail: jschauer@enr.wisc.edu

Professor Nino Kuenzli
Department of Preventative Medicine
University of Southern California
1540 Alcazar Street, CHP 236
Los Angeles, CA 90089-9013
Telephone: (323) 442-2870
e-mail: kuenzli@usc.edu