

R Subramanian
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Education

- 2004** **PhD** (Mechanical Engineering)
Carnegie Mellon University, Pittsburgh, PA, USA
Doctoral Thesis: “Sampling, Analysis and Source-Apportionment of Ambient Carbonaceous Aerosols”
Advisor: Professor Allen Robinson
- 1999** **MTech** (Energy Systems Engineering)
Indian Institute of Technology – Bombay, Mumbai, India
Master’s Dissertation: “Simulation of a Hybrid Electric Vehicle”
Advisors: Professors Uday Gaitonde and Anuradda Ganesh
- 1996** **BE** (Automobile Engineering)
University of Mumbai (formerly Bombay), Mumbai, India

Research experience

- April 2009 to date** **Research Scientist**
- Jan 2007 to Mar 2009** **Postdoctoral Research Scientist** (Advisor: Dr Gregory Kok)
Droplet Measurement Technologies (DMT)
Boulder, CO
- Characterization of the DMT Single Particle Soot Photometer (SP2)
 - Development and characterization of the Fast Integrating Mobility Spectrometer (FIMS)
 - Analysis of SP2 strongly light-absorbing (black) carbon (LAC/BC) data from Megacity Initiative: Local and Global Research Observations (MILAGRO); Intercontinental Chemical Transport Experiment (INTEX-B); and Pacific Dust Experiment (PacDEX)
 - Aircraft-based measurements to study Mexico City and Asian outflows
 - LAC measurements for Ice in Clouds Experiment (ICE-L) to study aerosol/cloud interactions
- Nov 2004 to Dec 2006** **Postdoctoral Research Associate**
Advisor: Professor Tami Bond
University of Illinois at Urbana-Champaign
- Diesel vehicle emissions characterization for Thailand: management of the analytical laboratory; interaction with partner institutions/NGOs (the World Bank, AIT, CATF)
 - Characterization of particulate emissions from biomass combustion
 - Study of organic aerosol charring during thermal-optical analysis of carbonaceous aerosol
- July 2000 – August 2004** **Graduate Research Assistant**
Pittsburgh Air Quality Study, Carnegie Mellon University
- Worked in close collaboration with faculty, post-doctoral researchers and students from multiple disciplines and across universities
 - Source-receptor modeling of ambient organic aerosol in Pittsburgh, PA
 - Instrument response of carbonaceous aerosol under different analytical protocols
 - Development of a denuder-based organic aerosol sampler

April – October 1999 **Project Engineer**
Thermal Hydraulic Test Facility
Department of Mechanical Engineering, IIT-Bombay

July 1996 – July 1997 **Trainee Engineer**
Transmission Systems R&D
Mahindra & Mahindra Ltd, Nashik, India

Teaching experience

Spring 2004 **Graduate Research Assistant**
Worked on developing and evaluating CyclePad, an intelligent tutor for thermodynamic cycles

Fall 2003 **Graduate Teaching Assistant**
Sophomore thermodynamics
(both of the above at the Department of Mechanical Engineering, Carnegie Mellon University)

Aug 1997 – Jan 1999 **Graduate Teaching Assistant**
Sophomore thermodynamics and heat transfer
Department of Mechanical Engineering, IIT-Bombay

Research interests

- Air quality, human health and climate change
- Aerosol characterization and instrument development
- Source apportionment of ambient particulate matter
- Alternative energy sources and their environmental impact

Journal publications

R Subramanian, Ekbordin Winijkul, Tami Bond, Worrarat Thiansathit, Nguyen Thi Kim Oanh, Ittipol Paw-armart and KG Duleep (2009). “Climate-relevant properties of diesel particulate emissions: Results from a piggyback study in Bangkok, Thailand.” **Environmental Science & Technology**, doi:10.1021/es8032296.

R Subramanian, Christoph Roden, Poonam Boparai and Tami Bond (2007). “Yellow beads and missing particles: Trouble ahead for filter-based absorption measurements.” **Aerosol Science & Technology**, 41(6): 630 – 637.

R Subramanian, Neil Donahue, Anna Bernardo-Bricker, Wolfgang Rogge and Allen Robinson (2007). “Insights into the primary-secondary and regional-local contributions to organic aerosol and PM_{2.5} mass in Pittsburgh, Pennsylvania.” **Atmospheric Environment**, 41(35): 7414-7433.

R Subramanian, Neil Donahue, Anna Bernardo-Bricker, Wolfgang Rogge and Allen Robinson (2006). “Contribution of motor vehicle emissions to the ambient organic carbon and fine particle mass in Pittsburgh, PA: Effects of varying source profiles and seasonal trends in ambient marker concentrations.” **Atmospheric Environment**, 40(40): 8002-8019.

R Subramanian, Andrey Khlystov and Allen Robinson (2006). “Effect of peak inert-mode temperature on elemental carbon measured using thermal-optical analysis.” **Aerosol Science & Technology**, 40(10):763–780.

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R Subramanian, Andrey Khlystov, Juan Cabada and Allen Robinson (2004). “Positive and negative artifacts in particulate organic carbon measurements with denuded and undenuded sampler configurations.” **Aerosol Science & Technology**, 38(S1):27–48.

Allen Robinson, R Subramanian, Neil Donahue, Anna Bernardo-Bricker and Wolfgang Rogge (2006). “Source apportionment of molecular markers and organic aerosol – 1. Polycyclic aromatic hydrocarbons and methodology for data visualization.” **Environmental Science & Technology**, 40(24): 7803-7810.

Allen Robinson, R Subramanian, Neil Donahue, Anna Bernardo-Bricker and Wolfgang Rogge (2006). “Source apportionment of molecular markers and organic aerosol – 2. Biomass smoke.” **Environmental Science & Technology**, 40(24): 7811-7819.

Allen Robinson, R Subramanian, Neil Donahue, Anna Bernardo-Bricker and Wolfgang Rogge (2006). “Source apportionment of molecular markers and organic aerosol – 3. Food cooking emissions.” **Environmental Science & Technology**, 40(24): 7820-7827.

Darrel Baumgardner, R Subramanian, Cynthia Twohy, Jeff Stith and Gregory Kok (2008). “Scavenging of black carbon by ice crystals over the northern Pacific.” **Geophysical Research Letters**, **35**, L22815, doi:10.1029/2008GL035764.

Manish Shrivastava, R Subramanian, Wolfgang Rogge and Allen Robinson (2007). “Sources of organic aerosol: Positive matrix factorization of molecular marker data and comparison of results from different source apportionment models.” **Atmospheric Environment**, 41(40): 9353-9369.

Juan Cabada, Spyros Pandis, R Subramanian, Allen Robinson, Andrea Polidori and Barbara Turpin (2004). “Estimating the secondary organic aerosol contribution to PM_{2.5} using the EC tracer method.” **Aerosol Science & Technology**, 38(S1):140–155.

Andrea Polidori, Barbara Turpin, Ho-Jin Lim, Juan Cabada, R Subramanian and Allen Robinson (2006). “Secondary organic aerosol formation during the Pittsburgh Air Quality Study (PAQS).” **Aerosol Science & Technology**, 40(10):861–872.

Publications under review

R Subramanian, Greg Kok, Darrel Baumgardner, Antony Clarke, Yohei Shinozuka, TL Campos, CG Heizer, and BB Stephens (2009). “Black carbon over Mexico: the effect of atmospheric transport on mixing state, mass absorption cross-section, and BC/CO ratios.” *Atmospheric Chemistry & Physics Discussions*, **9**:9081-9115.

Francesco Maimone, Barbara Turpin, Qing Yu Meng, Paul Solomon, Allen Robinson, R Subramanian and Andrea Polidori. “Correction methods for organic carbon artifacts when using quartz-fiber filters in large particulate matter monitoring networks: The regression method and other options.” **Journal of the Air & Waste Management Association**.

Selected conference presentations

R Subramanian, Gregory Kok, Darrel Baumgardner and Cynthia Twohy. “Light-absorbing carbon in cloud residual nuclei during ICE-L: Combining the single particle soot photometer and the counterflow virtual impactor.” **AAAR Annual Conference 2008**, Orlando, FL (*talk*)

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R Subramanian, Gregory Kok, Darrel Baumgardner, Olga Popovicheva, Robert Cary, Thomas Kirchstetter, et al. "Towards a reference material for soot/LAC measurement: Evaluation of candidates with electron microscopy, SP2 and thermal-optical analysis." **9th International Conference on Carbonaceous Particles in the Atmosphere** (2008), Berkeley, CA (*talk*)

R Subramanian, Gregory Kok, Cynthia Twohy and Darrel Baumgardner. "Black carbon in cloud residual nuclei during PACDEX: Combining the single particle soot photometer and the counterflow virtual impactor." **Fall Meeting of the American Geophysical Union (2007)**, San Francisco, CA (*talk*)

R Subramanian, Gregory Kok and Darrel Baumgardner. "Single-particle black carbon measurements during PacDEX." **Fall Meeting of the American Geophysical Union (2007)**, San Francisco, CA (*poster*)

R Subramanian, Gregory Kok and Darrel Baumgardner. "Single particle black carbon and BC mixing state measurements over Mexico City and Seattle: Results from the MILAGRO and INTEX-B studies." **AAAR Annual Conference 2007**, Reno, NV (*poster*)

R Subramanian, Poonam Boparai and Tami Bond. "Charring of organic compounds during thermal-optical analysis (TOA): What can we learn about the carbonaceous aerosol?" **233rd ACS National Meeting (March 2007)**, Chicago, IL (*talk*)

R Subramanian, Tami Bond, Worrarat Thiansathit, Nguyen Thi Kim Oanh, KG Duleep, Ittipol Paw-armart and Ekbordin Winijkul. "Diesel vehicle emissions in Thailand: PM_{2.5} mass, composition, and light absorption." **Seventh International Aerosol Conference 2006**, St Paul, MN (*poster*)

R Subramanian, Allen Robinson, Anna Bernardo-Bricker and Wolfgang Rogge. "Organic carbon mass balance and source apportionment of primary organic carbon in the Pittsburgh region using molecular markers." **American Association for Aerosol Research (AAAR) Particulate Matter Supersites Program & Related Studies 2005**, Atlanta, GA (*talk*)

R Subramanian, Allen Robinson and Andrey Khlystov. "OC/EC analysis with Thermal-Optical methods: Effects of temperature protocol and non-carbonaceous compounds." **AAAR Particulate Matter Supersites Program & Related Studies 2005**, Atlanta, GA (*talk*)

R Subramanian, Andrey Khlystov and Allen Robinson. "Effects of refractory material and temperature protocol on measurement of particulate elemental carbon using the Thermal-Optical Transmittance method." **AAAR Annual Conference 2003**, Anaheim, CA (*talk*)

R Subramanian, Andrey Khlystov, Barbara Turpin and Allen Robinson. "Measurement of ambient elemental carbon using the Thermal-Optical Transmittance technique." **Fall Meeting of the American Geophysical Union (2002)**, San Francisco, CA (*poster*)

R Subramanian, Andrey Khlystov, Barbara Turpin and Allen Robinson. "Measurement of ambient carbonaceous aerosols during the Pittsburgh Air Quality Study." **Air & Waste Management Association Symposium on Air Quality Measurement Methods and Technology 2002**, San Francisco, CA (*talk*)

R Subramanian, Andrey Khlystov, Juan Cabada and Allen Robinson. "Sampling artifacts during measurement of ambient carbonaceous aerosol." **AAAR Annual Conference 2002**, Charlotte, NC (*talk*)

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