

# Philip Douglas Whitefield

## POSITION:

Professor Emeritus of Chemistry, Missouri University of Science and Technology (Missouri S&T)  
Director of the Missouri S&T Center of Excellence for Aerospace Particulate Emissions Research

## EXPERIENCE

09/2019 – Currently	Professor Emeritus of Chemistry, Missouri S&T
09/2019 – 09/2022	Chancellor's Professor, Department of Chemistry Missouri S&T
01/2017 – 09/2019	Director of the Missouri S&T Center for Research in Energy and Environment
10/2014 – 08/2018	Chair of the Department of Chemistry, Missouri S&T
09/2011 – 10/2014	Interim Vice Provost for Academic Affairs Missouri S&T
09/2005 – 08/2011	Chair of the Department of Chemistry, Missouri S&T
06/2002 – 12/2016	Associate Director of the Missouri S&T Environmental Research Center for Emerging Contaminants (ERC)
09/2004 – 09/2019	Professor of Chemistry
09/2003 – Present	Director of the Missouri S&T Center of Excellence for Aerospace Particulate Emissions Research
09/1997 – 08/2004	Associate Professor of Chemistry
09/1990 – 08/1997	Research Associate Professor, University of Missouri-Rolla,
10/1981 – 08/1990	Scientist, McDonnell Douglas Research Laboratories, (MDRL),
09/1979 – 09/1981	National Research Council Resident Research Associate (NRC/RRA) at the Air Force Weapons Laboratory (AFWL),
09/1978 – 08/1979	Post-Doctoral Research Fellow, Department of Chemistry, Queen Mary College, University of London, London England

## EDUCATION

Ph.D. Physical Chemistry (1979), University of London - Queen Mary College, London, England  
B.Sc. (Hons) Chemistry (1975), University of London - Queen Mary College, London, England

## RESEARCH RESPONSIBILITIES:

I am the Director of the MS&T Center of Excellence for Aerospace Particulate Emissions Research, where I lead an internationally recognized research program associated with the chemical and physical characterization of ultrafine particulate matter. Specifically, I coordinate with a team of researchers from academia, the federal government, (NASA, FAA, DoD, EPA, NRC) and the private sector studying the particulate matter generated by aerospace activities. This research program, initiated in 1990, has three major thrust areas – emissions measurement, interpretation of emissions measurements and the development of novel state of the art instrumentation tailored specifically to support the measurement and interpretation thrusts. This research has resulted in, to date, externally sponsored funding in excess of \$22.5M and the recent adoption of a global regulatory standard measurement methodology for jet engine certification of non-volatile particulate matter (nvPM) emissions. I am principal investigator on research grants and contracts currently and/or recently funded and sponsored by the Transportation Research Board TRB of the National Academies, FAA, NASA, USAF, USNAVY, Boeing, Pratt and Whitney, General Electric, Lockheed Martin, Rolls Royce, the European Aviation Safety Agency (EASA), Shell, the United Kingdom Ministry of Defense, the German Aerospace Center (DLR), and the Swiss Federal laboratories for Material Science and Technology (ETH-EMPA). I am the Principal Investigator for Missouri S&T as one of the founding universities in the FAA, NASA, Transport Canada Centers of Excellence – for Alternative jet fuels and environment, (ASCENT) and Partnership for Air Transportation Noise and Emissions Reduction (PARTNER) and am the Centers' lead scientist for the Emissions Characterization component of the Center's research. I am or have been an advisor to NASA on emissions environmental impact for the Vehicle Systems Program, the Ultra Efficient Engine Technology (UEET) and Atmospheric Effects of Aviation (AEA), Stratospheric Aerosol Science, Near Field Interactions, and Emissions and Trace Chemistry committees, and the AIAA Technical Committee on Atmosphere and Environment. I have also advised the DoD on PM emissions measurement strategies for the JSF aircraft and its legacy aircraft. I was recently invited to advise the Particulate Matter Task Group for the International Civil Aviation Organization Committee on Aviation Environmental Protection Working Group 3 (ICAO/CAEPWG3/PMTG) and have been a member of the Environmental Integrated Product Team (IPT) for the Joint Projects Development Office, formed by the Secretary of Transportation to support VISION 100 – CENTURY OF AVIATION REAUTHORIZATION ACT PUBLIC LAW 108-176 with a goal to develop the Next Generation Air Transportation System (NGATS). I currently advise the FAA on Sustainable Aviation Jet Fuel emissions and on emissions issues relate to commercial space transportation I am a member of the American Chemical society and The society of Automotive Engineers (SAE) E31 committee. I have over 100 publications and presentations recorded in the open literature and one patent.

**PUBLICATIONS:** I have over 100 publications and presentations recorded in the open literature and one patent. I was a lead author for chapter 7 of **The Intergovernmental Panel on Climate Control (IPCC) Special Report on Aviation and the Global Atmosphere, published in May 1999. This document became one of the five IPCC reports responsible for the 2007 Nobel Prize Award to the IPCC.** I am also a lead author on two National Academy of Science Reports and the co-author on seven major international reports published in the field of the environmental impact of aircraft exhaust on the atmosphere.

#### Recent Publications

Quantification of the repeatability and reproducibility of the CPMA-electrometer reference mass standard for in-situ calibration of mass concentration aerosol instruments, *Aerosol Sci and Tech* -submitted December 2024

Characterizing the Transient Emission of Particles and Gases from a Single Puff of Electronic Cigarette Smoke, *Chemical Research in Toxicology* -submitted October 2024

Aircraft engine particulate matter emissions from conventional aviation fuels: Results from ground-based measurements during the NASA/DLR campaign ECLIF2/ND-MAX, *Fuel* **325**, 2022, 124764

Aircraft engine particulate matter emissions from conventional and sustainable aviation fuel combustion: comparison of measurement techniques for mass number and size. *Atmospheric Measurement Techniques* 2021-320

Calibration of Gas Flow Meters using Choked Flow and an Evacuated Vessel  
*Measurement Science and Technology* 32,10,2021

As Close as It Might Get to the Real Lab Experience -- Live-Streamed Laboratory Activities  
*Journal of Chemical Education* 97,09,2020

Comparison of Standardized Sampling and Measurement Reference Systems for Aircraft Engine Non-Volatile Particulate Matter Emissions  
*Journal of Aerosol Science* 145,2020

Comparison of Aircraft Engine Particle Emissions at Cruise Altitude and at the Ground: Observations from ACCESS and ECLIF-II / ND-MAX  
*Proceedings of the American Geophysical Union Fall Meeting 2019* (2019, San Francisco, CA) December 2019

Application of a Hygroscopicity Tandem Differential Mobility Analyzer for Characterizing PM Emissions in Exhaust Plumes from an Aircraft Engine Burning Conventional and Alternative Fuels  
*Atmospheric Chemistry and Physics* 18 23 2018

Demonstration of a Regulatory Method for Aircraft Engine Nonvolatile PM Emissions Measurements with Conventional and Isoparaaffinic Kerosene Fuels  
*Energy and Fuels* 30 9 2016

Measurement of Aircraft Engine Non-Volatile PM Emissions: Results of the Aviation-Particle Regulatory Instrumentation Demonstration Experiment (A-PRIDE) 4 Campaign  
*Aerosol Science and Technology* 49 07 2015

