

ME 250 SEMINAR

Understanding Primary Emissions from Mobile Sources and Their Link to Secondary Aerosols: The Effects of Fuel Composition, Exhaust Aftertreatment, and Driving Conditions

Transportation-related air pollution is significant in the U.S. and across the world. Motor vehicles have been recognized already since the 1950s to contribute to urban smog, while in the 1990s epidemiological studies raised concerns about potential health associations with particulate matter (PM₁₀ and PM_{2.5}). Sacrificing transportation needs for environmental quality and public health is simply infeasible. How do we meet the transportation needs in the age of development without sacrificing environmental sustainability and public health? My research activities are centered on advancements in the sustainability of alternative and biomass-derived fuels combustion applications by combining applied and fundamental measurement tools, with a current focus on internal combustion engine applications. This seminar presents the impacts of fuel composition, robust aftertreatment controls, and driving conditions on primary emissions and secondary aerosol formation from current technology engine platforms. I will demonstrate that fuel composition and engine technology, including exhaust aftertreatment control, will significantly affect the formation of primary emissions, as well as the potential formation of secondary aerosols. I will then present that based on the current tools and knowledge, we are able to sufficiently predict the primary particulate emissions and secondary organic aerosol from current engine technologies.

THURSDAY, Oct 7, 2021

ZOOM
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11:00 AM - 11:50 AM



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Dr. Georgios Karavalakis is an Associate Adjunct Professor and Research Faculty with the University of California, Riverside. His research interests focus on the combustion of alternative and biomass low-carbon and zero-carbon fuels in combustion systems, with an emphasis on the formation mechanisms of particulate matter and their physicochemical and biological properties. His research is also emphasizing on the production of secondary aerosols from mobile sources. Since joining UCR in 2010, he led the CRC AVFL-17b and CRC E-117 studies, while his research program as primary- and co-investigator has attracted approximately \$17.5 million. He has published more than 90 papers in the top journals, 2 book chapters, and more than 120 conference papers and presentations. His work is generally well cited with more than 4180 citations since 2009 (h-index=33). Prior to arriving at UCR, Georgios obtained his Ph.D. in Chemical Engineering from the National Technical University of Athens. His dual experience in chemical and mechanical engineering forms the foundation for his unique integrated research approach at UCR – a tight coupling of combustion engine emissions and low-/zero-carbon fuels with atmospheric transformations of pollutants to accelerate fundamental understanding of an optimized combustion system to air quality, climate, and public health.