The EFLUM lab has the pleasure to announce a seminar

Monday, August 31st, 2009 at 11h30
Room GRC01

Physical, Chemical and Toxicological Characteristics of Ultrafine Particulate Matter (PM): Summary of 9 years Research by the US EPA Southern California Particle Center

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Combustion related aerosols, especially traffic-induced emissions, are the dominant contributors of ambient particulate matter (PM) in urban environments. The goals of our research undertaken by the Southern California Particle Center, the largest air pollution center funded by the US EPA in the US, were to create an extensive inventory on what is known about the physical and chemical characteristics of atmospheric ultrafine particles. Utilizing a mobile particle concentrator, researchers set about characterizing the physical and chemical PM characteristics and volatility on/near freeways, in source and receptor areas of the Los Angeles Basin, the impact of mobile sources on indoor environments as well as ultrafine PM characteristics and emission factors in roadway tunnels with light-duty or heavy-duty vehicles. The data provided an increased understanding of how physical and chemical characteristics of ultrafine particles change on/near heavily trafficked areas; this information is necessary to better understand exposure outcomes. A better understanding of ultrafine particle characteristics and their volatility allows for the narrowing of the search for the most toxic PM components, and would also suggest new emissions control technologies that better protect the public health. Current particle traps remove non-volatile soot particles but not the precursors of the smaller semi-volatile particles. An unintended result of this reduction of the larger, non-volatile particles from the exhaust is the potential increase in the formation/emission of the smaller, semi-volatile PM as seen in our experiments performed in roadway tunnel and dynamometer studies where we link PM semi-volatile components and their redox activity, and we discuss the influence and importance of PM volatility on particle toxicity. Finally, we discuss possible metrics to regulate PM emissions and establish ambient air quality standards that are pertinent to public health, and suggests future investigations aimed to improve our current understanding of the adverse health effects of public exposures to combustion related aerosols.

Constantinos Sioutas, ScD, is the Fred Champion Professor of Civil and Environmental Engineering at USC. He is also the Co-Director of the Southern California Particle Center (SCPC), established in late 1999 by the US EPA, a leading Center in the nation for the study of the nature and health effects of airborne PM. He received his ScD from Harvard University in 1994. Dr. Sioutas's research has followed an integrated approach to the problem of the well-publicized and significant effects of particulate air pollution on health and the environment. His research has focused on investigations of the underlying mechanisms that produce the health effects associated with exposure to air pollutants generated by a variety of combustion sources and photochemically induced atmospheric reactions. During his faculty career, he has directed, as either a Principal or Co-Principal Investigator, some 40 research grants exceeding $40 million. He has authored 200 peer-reviewed journal publications, 5 book chapters and holds 13 U.S. patents in the development of instrumentation for aerosol measurement and emissions control. His published work has received over 4,500 citations according to the ISI Web of Science; he is among the top 1% authors worldwide in Engineering according to the Institute of Scientific Information. Results from his publications have been used by the US Environmental Protection Agency (EPA) in their National Air Quality Criteria document in promulgating stricter air quality standards in the US. He has advised 15 PhD students, and mentored 25 postdoctoral fellows at USC.