9PH.5
Formation and Transformation of Hazardous Components in the Atmosphere: Reactive Oxygen Species, Polycyclic Aromatic Compounds and Allergenic Proteins. MANABU SHIRAIWA, Andrea Arangio, Kathrin Selzle, Christopher Kampf, Ulrich Poeschl, *MPIC*

Epidemiological studies show correlations between air particulate matter and adverse health effects of air pollution including allergy, asthma, cardiovascular and respiratory diseases, but the causative relations and mechanisms of interaction on the molecular level are still unclear. Based on kinetic experiments and model simulations, we found that long-lived reactive oxygen intermediates (ROIs) are formed upon heterogeneous reactions of ozone with aerosol particles, such as hazardous polycyclic aromatic hydrocarbons and allergenic proteins. ROIs are defined as the subset of reactive oxygen species (ROS), including organic and inorganic species with reactive oxygen atoms or groups (O, RO, RO2 and so on). ROIs generated by photochemical and heterogeneous reactions in the atmosphere seem to play a key role in aerosol health effects and provide a direct link between atmospheric and physiological multiphase processes through various interfaces, such as plant surfaces and the human respiratory tract. Recent kinetic experiments showed that the nitration reaction of proteins with ozone and nitrogen dioxide proceeds through long-lived ROI, most likely phenoxy radical derivatives of tyrosine (tyrosyl radicals). Allergenic proteins are efficiently oxygenated and nitrated upon exposure to ozone and nitrogen dioxide in the polluted air, leading to an enhancement of their allergenicity.

9UA.1
Impacts of Complete Street Retrofit on On-road Fine and Ultrafine Particles Concentrations: A Case Study in Santa Monica, California. Shi Shu, Nu Yu, YIFANG ZHU, *UCLA*

Abstract: The California Complete Streets Act of 2008 requires local governments to update general plans so that new construction or modification of roadways considers all transportation modes, which include but are not limited to walking, cycling, and driving. This work evaluates the effect of a complete street retrofit on Ocean Park Boulevard (hereafter referred to as “the retrofit”) in Santa Monica, California, in terms of ultrafine particle (UFP) and fine particle (PM2.5) concentrations. The retrofit, which cost 4.4 million dollar, was constructed on the Ocean Park Boulevard in Santa Monica, CA between December 2011 and February 2013. The pre-retrofit on-road air quality study had been completed in March and April of 2011 and the data have been published. This post-retrofit study replicated the experimental design in April 2013 after the construction was finished, to provide air quality data comparable to those in pre-retrofit study. The meteorological conditions were similar in these two studies. After subtracting background concentrations, UFP decreased after the retrofit by 4200 particles cm-3 while PM2.5 had no statistically significant change. The raw traffic volume was manually counted based on video footages captured during each test session. The emission-weighted traffic volume was calculated based on vehicle categorization and the pollutant-emitting capacities of each category, same as it was done in the pre-retrofit study. The emission-weighted traffic volume decreased 26% after retrofit, which may explain why UFP reductions were observed while total traffic flow remained the same. Although no causality could be reached, this study observed improved air quality on street after retrofit. Nonetheless, a full evaluation of the health impacts of the retrofit requires further information about how travel behavior, not just traffic, has changed.