Fine particulate matter (PM$_{2.5}$) is an ensemble of particles suspended in air that are at least 2.5 microns or smaller in diameter and are known to contribute to adverse health effects, such as asthma and cardiopulmonary disease. PM$_{2.5}$ can be directly emitted into the atmosphere by anthropogenic sources, such as motor vehicles, power plants, and factories. Biogenic sources also can contribute to the formation of PM$_{2.5}$, especially isoprene (2-methyl-1,3-butadiene), a volatile organic compound (VOC) of interest in this study. Secondary organic aerosol (SOA) is a major component of PM$_{2.5}$ and can be produced from the atmospheric oxidation of biogenic VOCs in the presence of anthropogenic pollutants such nitrogen oxides and sulfur dioxide. However, whether biogenic SOA contributes to adverse health effects remains unclear. The objective of this study was to assess the reactive oxidant potential of isoprene-derived epoxides and SOA. The dithiothreitol (DTT) assay was used to characterize the reactive oxygen species (ROS) generation potential of individual isoprene-derived epoxides and their hydrolysis products, including isoprene epoxydiols (IEPOX), methacrylic acid epoxide (MAE), 2-methyltetrols (2-MT), and 2-methylglyceric acid (2-MG), and of SOA produced from photooxidation and reactive uptake experiments with isoprene, methacrolein (MACR), IEPOX, and MAE as precursors. It was found that 2-MG, MAE and MACR-derived SOA possess a higher oxidant generation potential compared to the 2-MT, IEPOX and isoprene-derived SOA system. Compared to prior studies with diesel exhaust PM, MAE and MACR-derived SOA show the same or higher ROS generation potential, and thus, highlights the need for more studies to further characterize SOA toxicity from this source.

**Committee:**

Prof. Jason D. Surratt (Advisor)  
Dr. Ying-Hsuan Lin (Co-Advisor)  
Prof. Avram Gold