

# Understanding The Formation Mechanism of Particulate Sulfate Under Controlled Real Ambient Air Conditions

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## Abstract

Sulfate is one of the major compositions of particulate matter (PM) and plays a leading role in PM formation. However, its formation mechanism still needs to be clarified due to uncertainty in the multiphase chemistry of SO<sub>2</sub> in particles. In particular, the heterogeneous oxidation of SO<sub>2</sub> by NO<sub>2</sub> on aerosol particles has recently been a major debatable issue as one of the major formation pathways of PM sulfate in the polluted troposphere. In this work, a large outdoor (100 m<sup>3</sup>) atmospheric simulation chamber facility at the Research Center for Eco-Environmental Sciences, Chinese Research Academy, was applied to simulate the PM sulfate formation process by taking real ambient air. A series of experiments were conducted by exposing different concentrations of SO<sub>2</sub> and NO<sub>2</sub> in different concentrations of real ambient PM, which were adjusted by taking real ambient air at different air quality days in Beijing, China, including excellent (PM<sub>2.5</sub> <25 µg/m<sup>3</sup>), Good (PM<sub>2.5</sub><50 µg/m<sup>3</sup>) and light polluted (PM<sub>2.5</sub><113 µg/m<sup>3</sup>) and heavy (115<PM<150 µg/m<sup>3</sup>). The role of relative humidity and light was evaluated. Finally, whether reactive nitrogen species oxidation pathways are dominant in addressing the missing sources of PM sulfate was discussed by comparing the experimental result and model simulation result.

## Early Career Scientist

YES, I am an early career scientist.

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