The Mystery of Spontaneous Interfacial Oxidant Production and Its Impact on The Tropospheric Oxidation Capacity

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Abstract

Aerosols and clouds are key players in tropospheric chemistry. These tiny particles suspended in the air, with a radius ranging from a few nanometres to tens of micrometres, impact atmospheric composition, represent one of the largest uncertainties in climatic projections and cause millions of deaths worldwide every year. Hence, they have enormous societal and economic consequences. Nonetheless, there is still a knowledge gap preventing us from describing the chemical evolution of aerosols and clouds during their atmospheric lifetime. Water molecules in bulk liquid are stable and inert under ambient conditions. In sharp contrast, it was very recently shown that the local orientation of water molecules at an air/water interface induces an electric field that generates spontaneous radicals in micron-sized droplets. This production does not involve any catalysts such as light or heat. It is an intrinsic property of the air/water interface, and therefore potentially ubiquitous in the troposphere. This spontaneous interfacial oxidant formation has never been explored for its atmospheric significance. Therefore, this presentation aims to unravel the atmospheric importance of this interfacial (dark) chemistry. If oxidants (including OH radicals) are in fact spontaneously produced at the air-water interface, under atmospherically relevant concentrations, this would profoundly challenge our understanding and description of atmospheric multiphase chemistry.

Early Career Scientist

NO, I am not an early career scientist.