Oxidation of SO2 and formation of water droplets under irradiation of 20MeV protons in N2/H2O/SO2 - DTU Orbit (15/01/2019)

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We have performed an experiment on charged droplet formation in a humidified N2 gas with trace SO2 concentration and induced by 20MeV proton irradiation. It is thought that SO2 reacts with the chemical species, such as OH radicals, generated through the reactions triggered by N2⁺ production. Both droplet number and droplet size increased with SO2 consumption for the proton irradiation. The total charged droplet numbers entering the differential mobility analyzer per unit time were proportional to the 0.68 power of the SO2 consumption. These two findings suggest that coagulation among the small droplets contributes to the formation of the droplets. The charged droplet volume detected per unit time is proportional to the SO2 consumption, which indicates that a constant amount of sulfur atoms is contained in a unit volume of droplet, regardless of different droplet-size distributions depending on the SO2 consumption.

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