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Negatively charged nanoparticles produced by splashing of water

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Abstract. The production of splashing-generated balloelectric intermediate ions was studied by means of mobility spectrometry in the atmosphere during the rain and in a laboratory experiment simulating the heavy rain. The partial neutralization of intermediate ions with cluster ions generated by beta rays suppressed the space charge of intermediate ions but preserved the shape of the mobility distribution. The balloelectric ions produced from the waterworks water of high TDS (Total Dissolved Solids) had about the same mobilities as the ions produced from the rainwater of low TDS. This suggests that the balloelectric ions can be considered as singly charged water nanoparticles. By different measurements, the diameter mode of these particles was 2.2–2.7 nm, which is close to the diameter of 2.5 nm of the Chaplin's 280-molecule magic icosahedron superclusters. The measurements can be explained by a hypothesis that the pressure of saturated vapor over the nanoparticle surface is suppressed by a number of magnitudes due to the internal structure of the particles near the size of 2.5 nm. The records of the concentration bursts of balloelectric ions in the atmosphere are formally similar to the records of the nucleation bursts but they cannot be qualified as nucleation bursts because the particles are not growing but shrinking.

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