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Jumping frost RANIT MUKHERJEE, FARZAD AHMADI, JONATHAN BOREYKO, Virginia Tech — Electrification of frost has been studied since the 1950s, mainly in the context of cloud physics. A few of these reports observed the ejection of ice particles from the growing frost, but only in the direction of a convective air flow. Moreover, the dynamics of the frost ejection were not modeled. Here, we show a phenomenon of micrometric frost dendrites jumping out-of-plane towards an opposing sheet of wetted paper, at characteristic velocities of about 0.1 m/s. This surprising jumping motion was in the absence of convective effects and in the opposite direction of the diffusive vapor flow growing the frost. Two different jumping regimes were observed: an initial constant acceleration regime followed by a constant velocity regime. The underlying mechanism for the frost jumping is a temperature-gradient-induced charge separation within the frost, resulting in an electrostatic attraction to the opposing surface.

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