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Anomalous External Charge Accumulation on High Voltage Fluidic Systems Overwhelms the Applied Field KRISTEN FAWOLE, WILLIAM RISTENPART, University of California, Davis — In systems where high voltage electric fields are applied to dielectric fluidic devices, the standard assumption is that the magnitude of the electric field is equal to the applied potential difference over the separation distance between the electrodes. Here, we show that charge accumulation at the external solid-air boundary of the fluidic system increases with time depending on ambient air humidity and electrode metal composition. A scaling analysis indicates the increase in charge at the boundary becomes comparable and even greater than the ostensible charge density of the electrode in very short time periods. We provide measurements of the rate of charge accumulation and discuss potential mechanisms for the anomalous increase in charge in high voltage fluidic systems.

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