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Figure S1. Diagram of experimental setup. Drawing is approximately to scale.

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Figure S2. Frequency spectrum of $(H_2O)_3H^+$ ion signal from a 10-Hz, square-wave LTP from 0 kV to 3 kV. The base peak at 10 Hz indicates that only one plasma pulse occurs per cycle. In contrast, a square wave from -3 kV to +3 kV produced two pulses per cycle.



Figure S3. Fourier spectra of $(H_2O)_3H^+$ ion signal for an LTP powered with a (a) sine, (b) triangle, (c) sawtooth, and (d) square wave. Note, other reagent ions produced

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Figure S4. Selected-ion chronograms for NO⁺ (blue), $(H_2O)_3H^+$ (black), and the MH⁺ for acetone (red) in the presence of acetone vapor. LTP used in this case was powered with a 10-Hz, 6 kV_{p-p} square-wave. Note that the trace for protonated acetone closely matches the profile for the protonated water cluster.