Supporting Information for:

Accurate Sizing of Nanoparticles Using a High-Throughput Charge Detection Mass Spectrometer without Energy Selection

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Rayleigh Limit for Charged Aqueous Droplets

The extent of charging necessary for fission of a spherical droplet to occur is described by the Rayleigh equation:[1]

$$Z_R = 8\pi e(\varepsilon_0 \gamma R^3)^{1/2} \tag{1}$$

where γ is the surface tension, Z_R is the charge on a spherical droplet with radius R, ε_0 is the permittivity of free space, and *e* is the elementary charge. This can be rewritten to provide a relationship between mass and charge if the density of droplet, *ρ*, is known, as shown in eq. 2.

$$Z_R = 4e\sqrt{\frac{3\pi\varepsilon_0 \gamma m}{\rho}} \tag{2}$$

The values for γ and *ρ* used are those for bulk pure water at 20°C and are 72.8 mN/m and 0.9982 g/mL respectively.[2] Eq. 2 was used to calculate the Rayleigh limit for the mass vs. charge plots (blue dashed line) in Figure 1b as well as Figure S1.

Reference

(1) Rayleigh, Lord. XX. On the Equilibrium of Liquid Conducting Masses Charged with Electricity. *London, Edinburgh, Dublin Philos. Mag. J. Sci.* **1882**, *14* (87), 184–186.

(2) Lide, D. R. *CRC Handbook of Chemistry and Physics*; CRC press, 2004; Vol. 85.

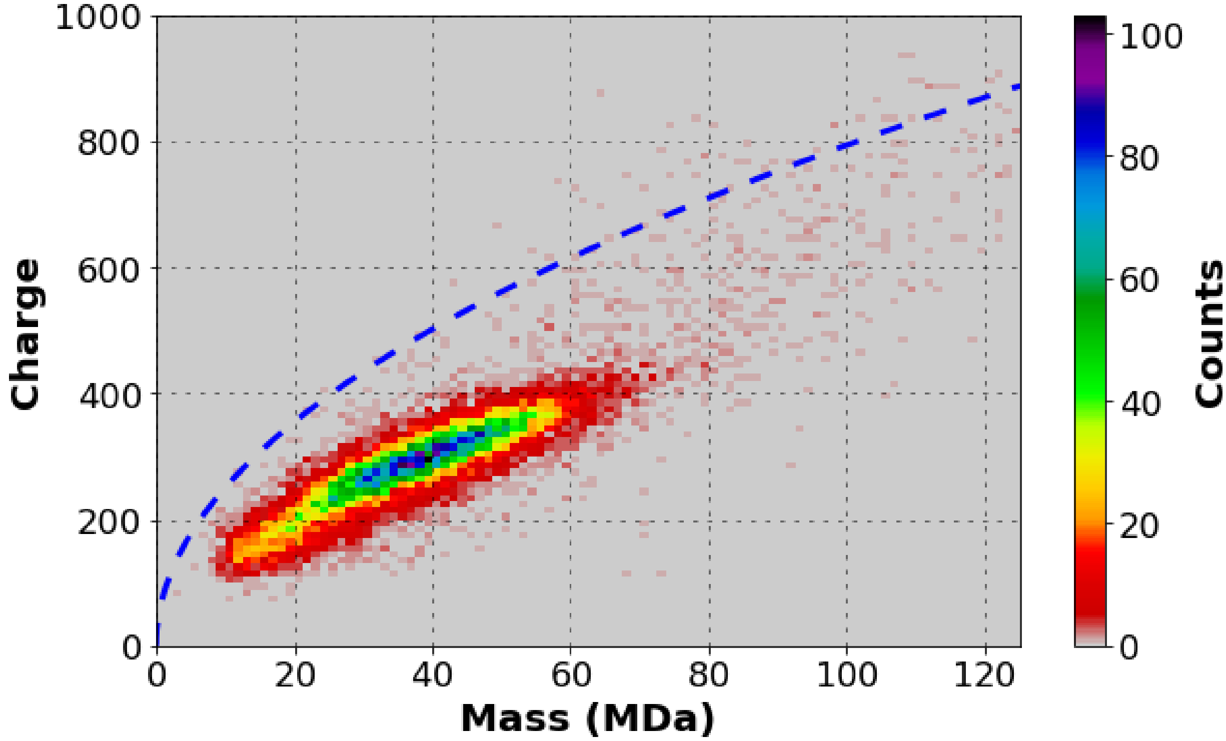

Figure S1. Two-dimensional mass vs. histogram for the ~50 nm nanoparticles. The blue dashed line is the Rayleigh charging limit of spherical droplets as a function of mass. The ~50 nm nanoparticles exhibit only a single smooth mass and charge distribution, suggesting that no dimers were present in this sample.