

Electronic Supplementary Information for

“Controlling morphology in electrospayed methylcellulose nanowires via nanoparticle addition: coarse-grained modeling and experiments”

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Supplementary Figures

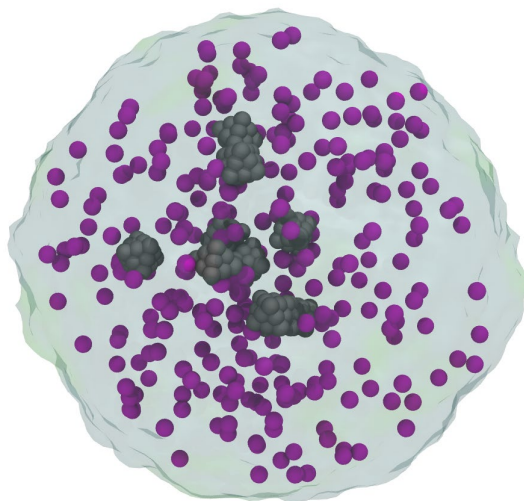


Figure S1. Equilibrated initial configuration of a methylcellulose solution droplet with multiple embedded nanoparticles. Clusters of gray beads represent the NPs and the magenta spheres are the charged ions. The transparent green surface represents the droplet surface. The solvent beads within the droplet and the surrounding gas beads are not displayed for clarity.

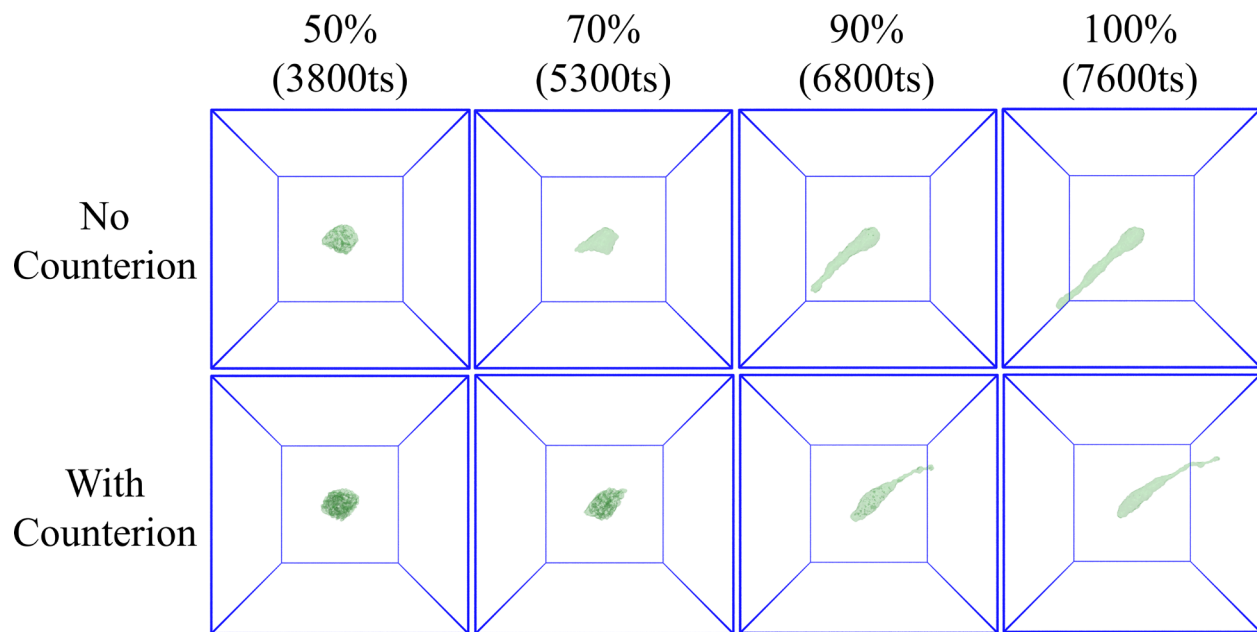


Figure S2. Comparison between nanowire formation of particle-free droplets in simulation systems with and without boundary counter ions.

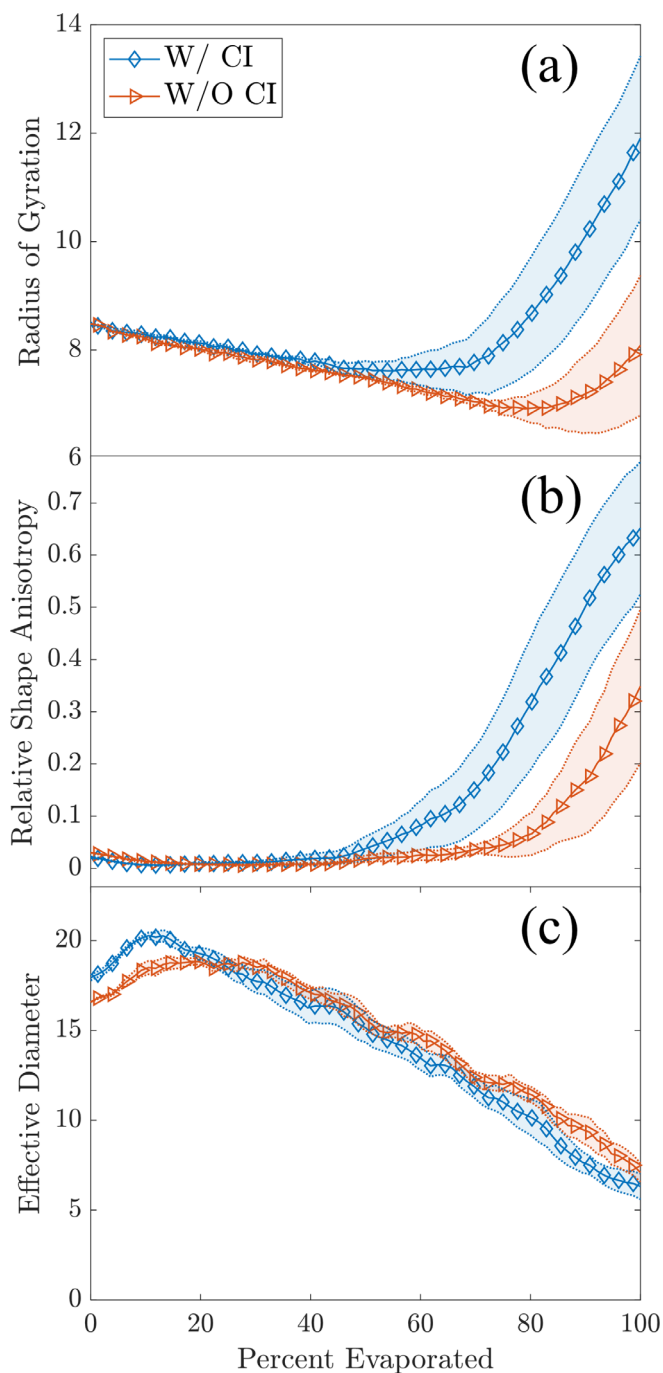


Figure S3. (a) Radius of gyration, (b) relative shape anisotropy, (c) effective diameter of the elongated particle-free MC droplets during evaporation for the system with and without counterions. The shaded error region represents the standard error of the mean from five independent runs.

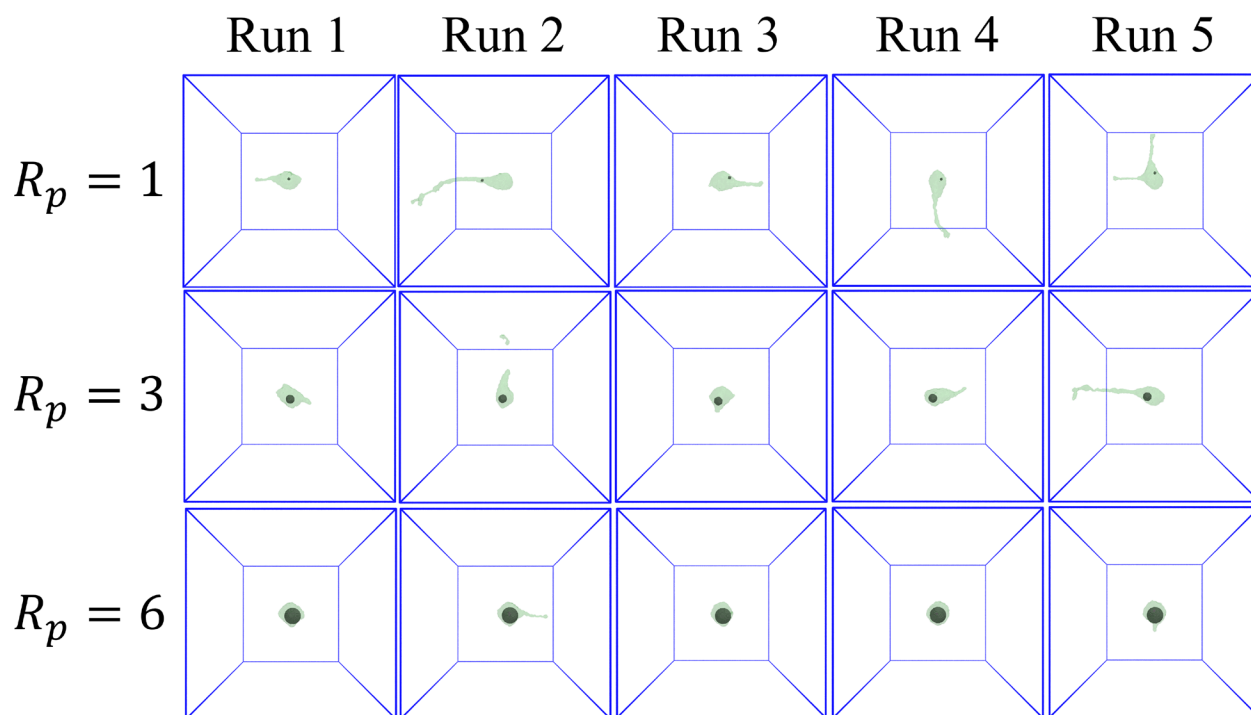


Figure S4. Final morphologies of fully evaporated (100% solvent beads removed) MC droplets with a single particle of varying size. The presentations of different components are the same as in Fig. 1.

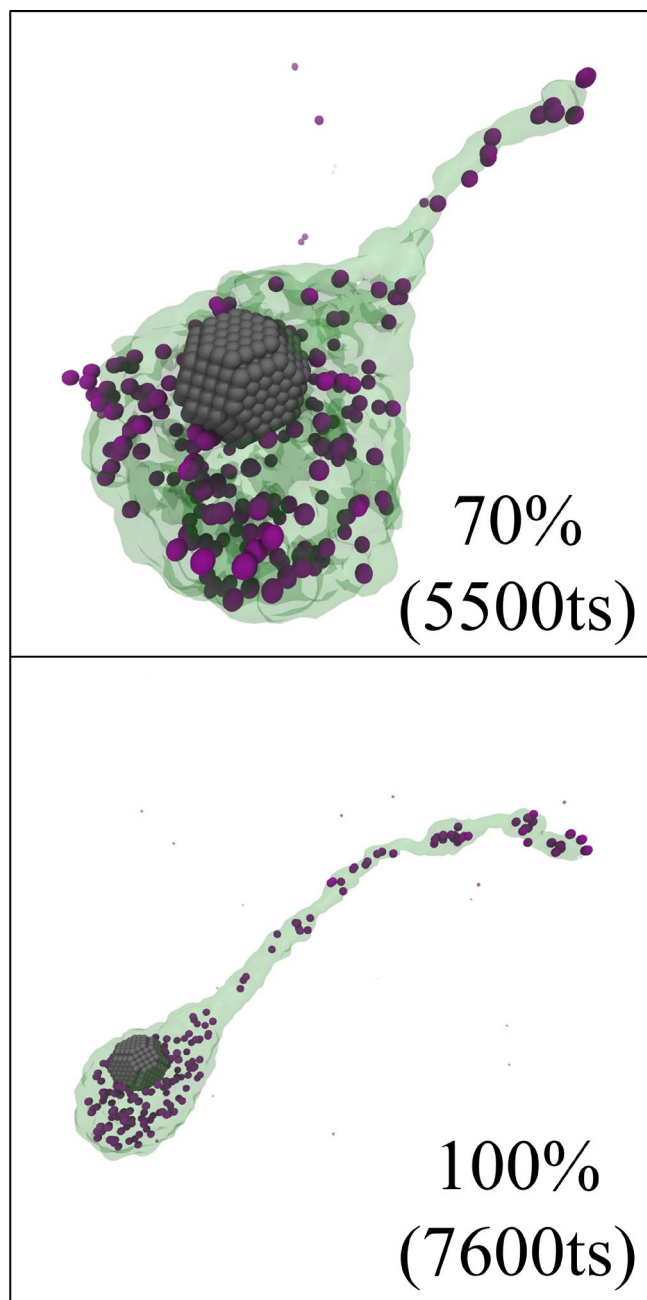


Figure S5. Detailed dynamics of droplet deformation under electric stress induced by highly concentrated charges represented by the magenta spheres. The droplet contains a single NP of size $R_p = 3$.

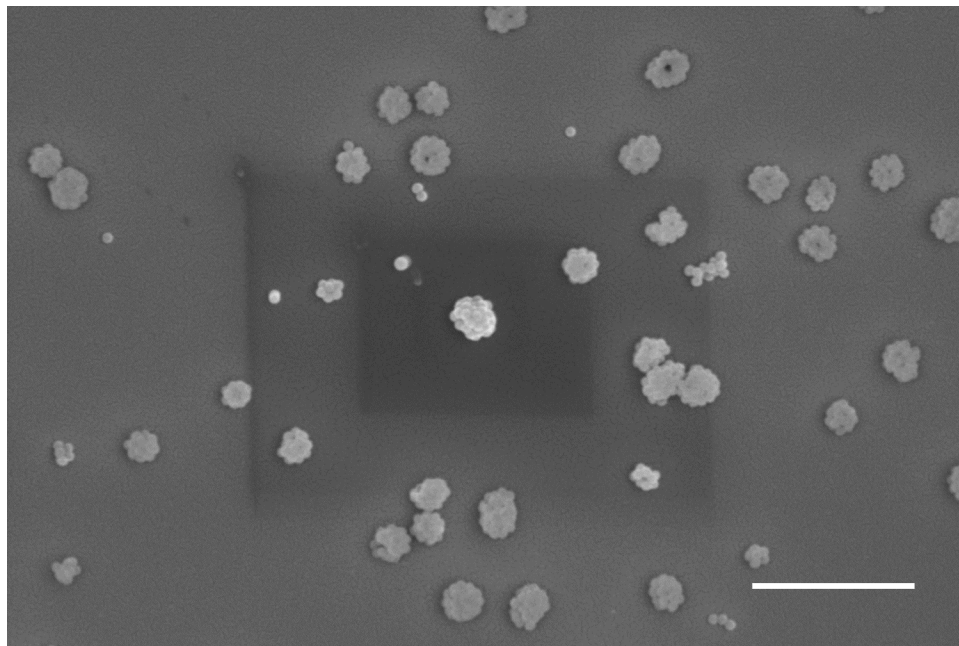


Figure S6. Scanning electron microscope (SEM) image of electrospayed 0.6 wt% 70 nm silica particles. Each droplet in the spray forms a quasi-spherical cluster of particles. The scale bar is 1 μm .

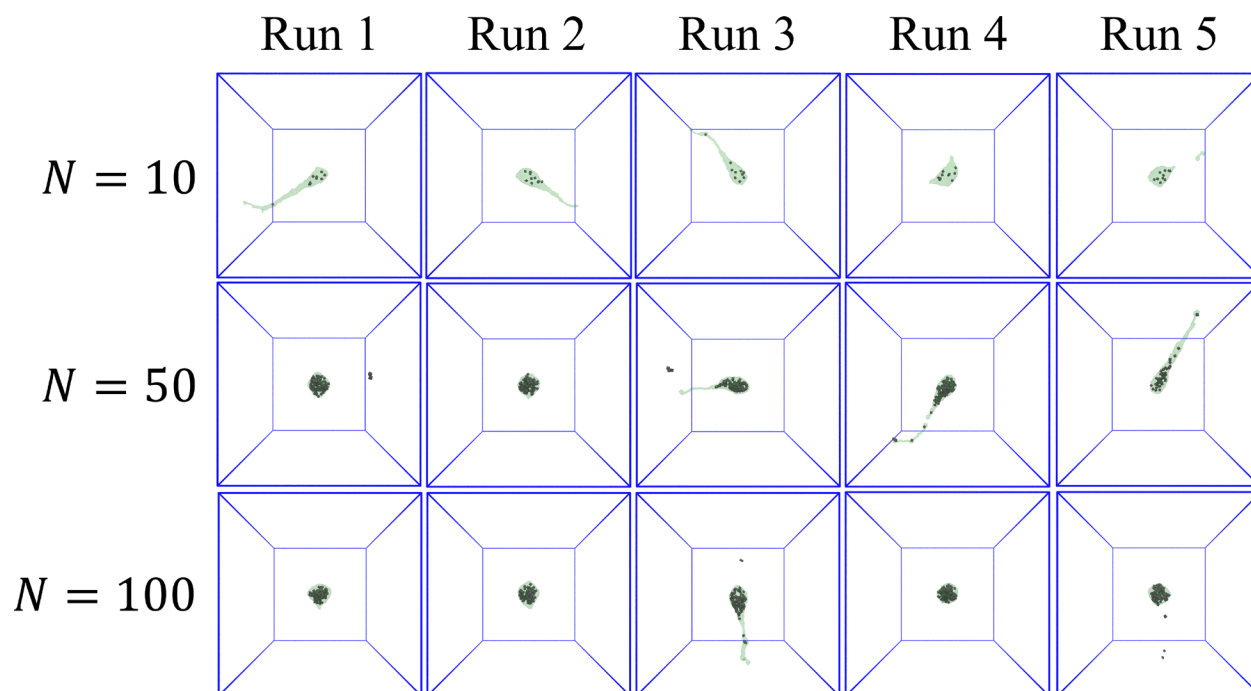


Figure S7. Final morphologies of fully evaporated (100% solvent beads removed) MC droplets with multiple $R_p = 1$ particles of different numbers. The presentations of different components are the same as in Fig. 1.

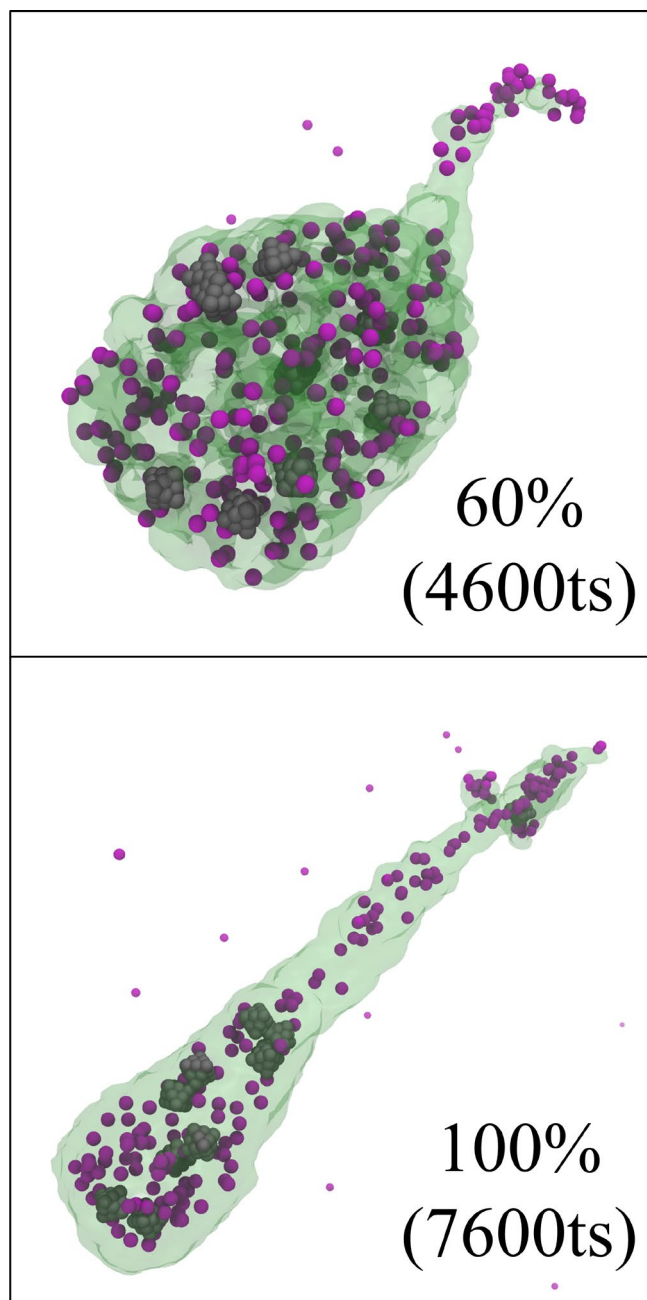


Figure S8. Detailed dynamics of electrohydrodynamic deformation of the MC droplet containing $N = 10$ particles of size $R_p = 1$.

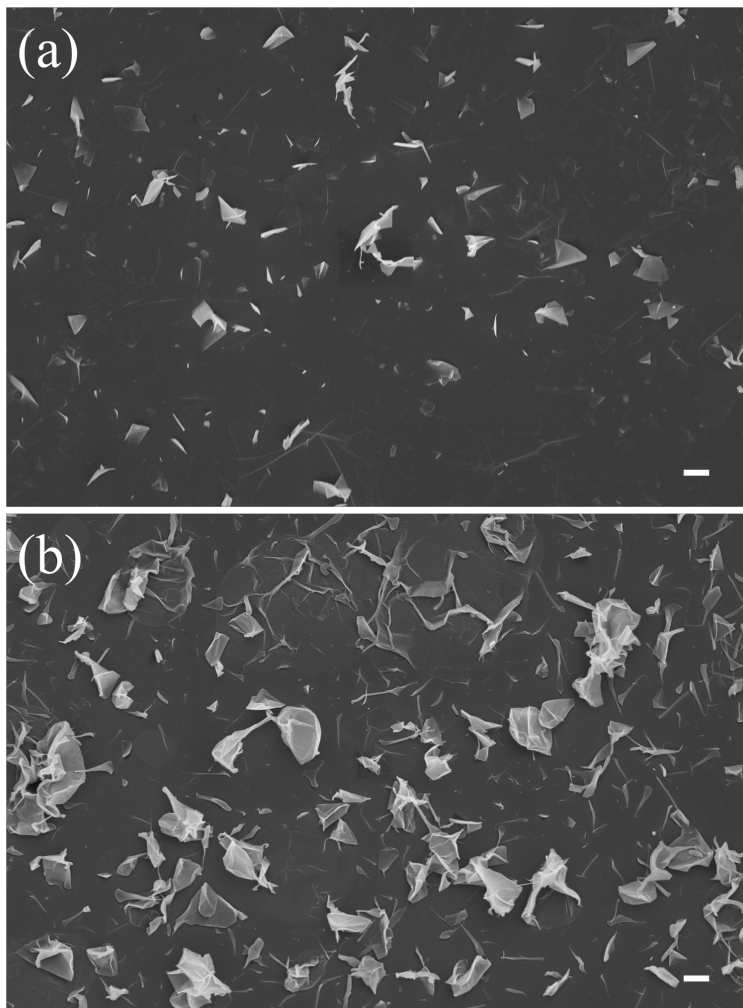


Figure S9. SEM images of electrospayed MXene (a) without MC at 1.2 wt% and (b) with 1 wt% MC at 0.3 wt%. Filament-like features are not present in (a) while they emit from particle vertices in (b). The scale bars are 1 μm .

Supplementary Videos

Video S1. Morphology evolution of the MC droplet with a single particle of size 3.

Video S2. Morphology evolution of the MC droplet with 10 particles of size 1.