Supporting Information for

The impact of sampling medium and environment on particle morphology

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S1. Particle generation and processing

An integrated system consisting of two differential mobility analyzers (DMA, TSI, 3081), an aerosol particle mass analyzer (APM, Kanomax, model 3601), a condensation particle counter (CPC, TSI, 3772), two thermal denuders (TD), and a set of pick-up chambers was used to process and characterize soot particles (Figure S1). The aerosol generation and conditioning section consisted of an inverted diffusion burner or atomizer as the particle source, several dilution stages, a silica gel drier, a Nafion drier (Perma Pure, PD-07018T-24MSS), a bipolar diffusion charger (Po-210, 400 µCi, NRD Staticmaster), DMA1, and TD1. Combustion of natural gas in purified air was used to generate soot. With the aid of a custom-made electrostatic precipitator, particles could be collected immediately after size classification (i.e. after DMA1) or after one or more stages of processing (after the coating chamber or DMA2).

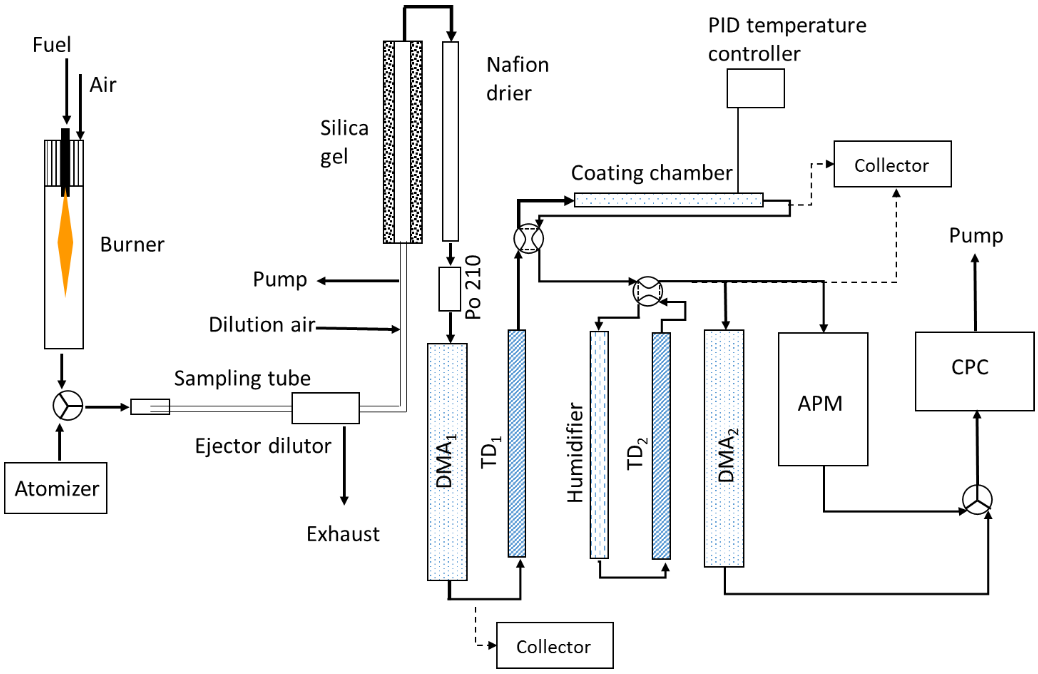

Figure S1. An integrated system for aerosol generation, processing, and analysis

S2. Image processing

The convexity was calculated as the ratio of the aggregate projected area (Figure S2b) to the convex hull polygon area (Figure S2a). Compared with compact aggregates, fractal aggregates have lower convexity.

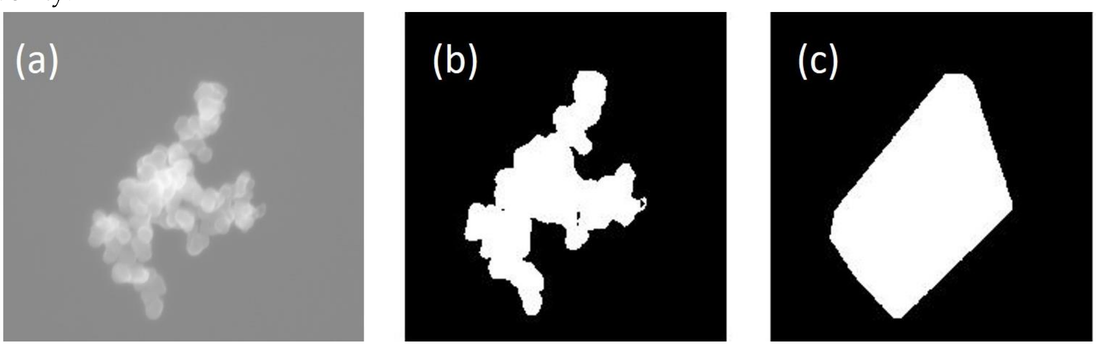

Figure S2. Calculation of convexity: (a) original Scanning Electron Microcopy (SEM) image, (b) 2D projected area of aggregate (c) convex polygon around aggregate.

The MATLAB code used to generate the projected area and convex hull polygon images:

```
clear
fname ='E:\NJIT\SEM data\170215-SA\convexity\06-00.tif';
invert = false;
% Original image
h = imtool(fname);
% B&W conversion of image
I = im2bw(I,0.5);
invert = true;
if invert
    I = ~I;
end
% Calculate Convexity
I1=bwconvhull(I);
a_aggregate = sum(I(:));
a_convex = sum(I1(:));
Convexity=a_aggregate/a_convex
```