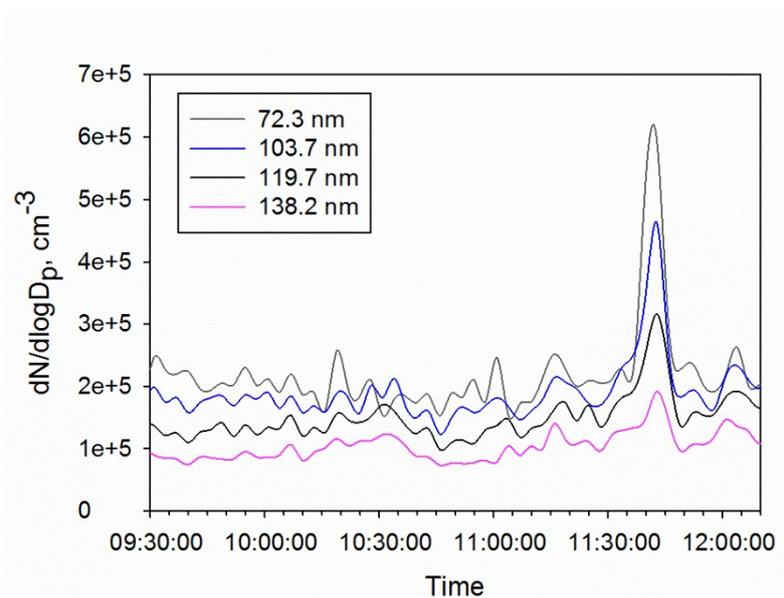
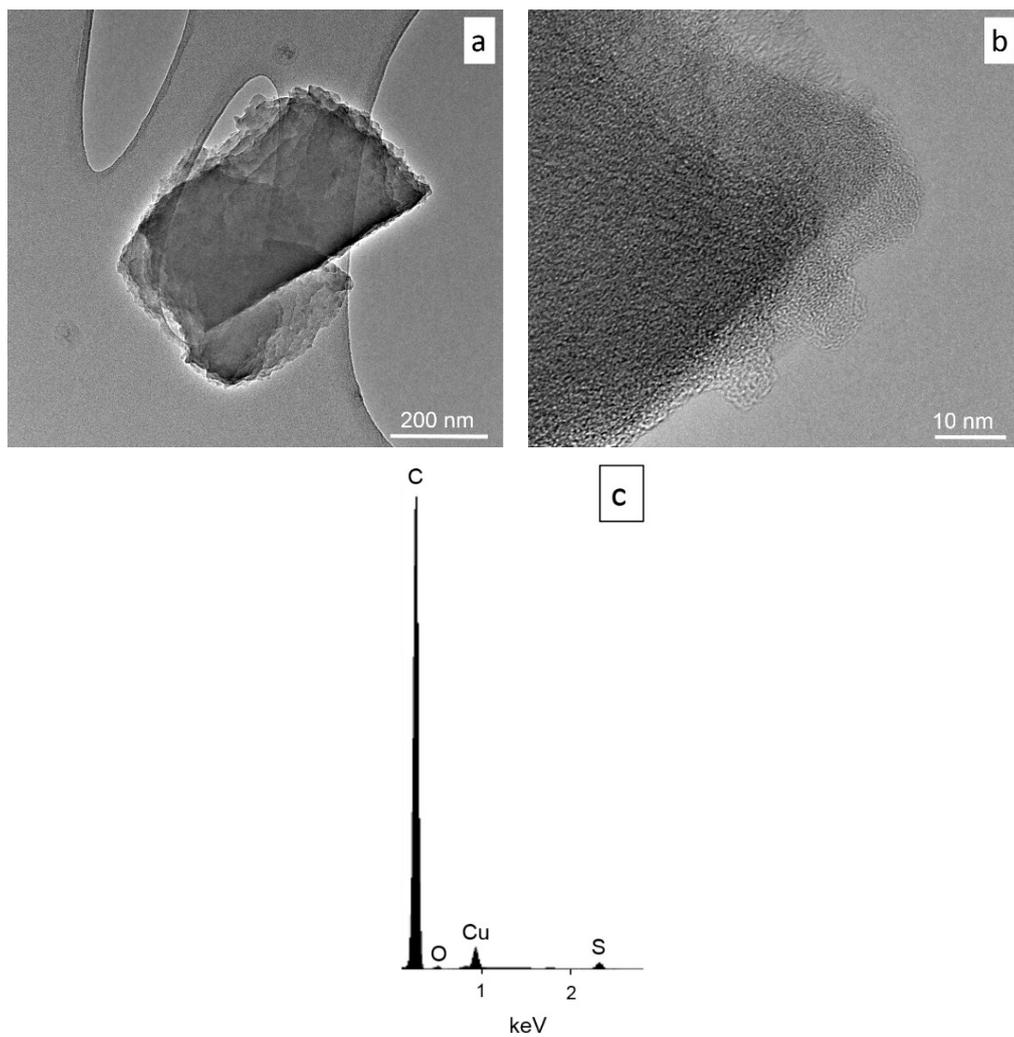


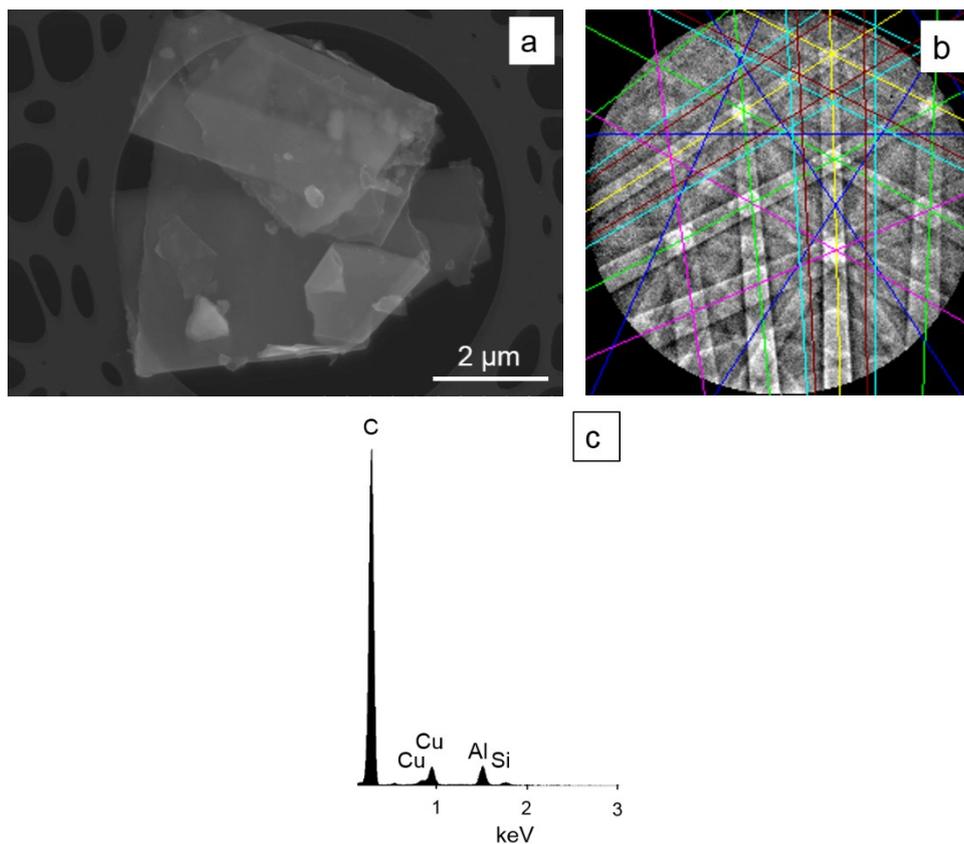
**Figure S1:** Sketch showing the Acheson Furnace Hall. The red dot shows the location of the instruments during the sampling.



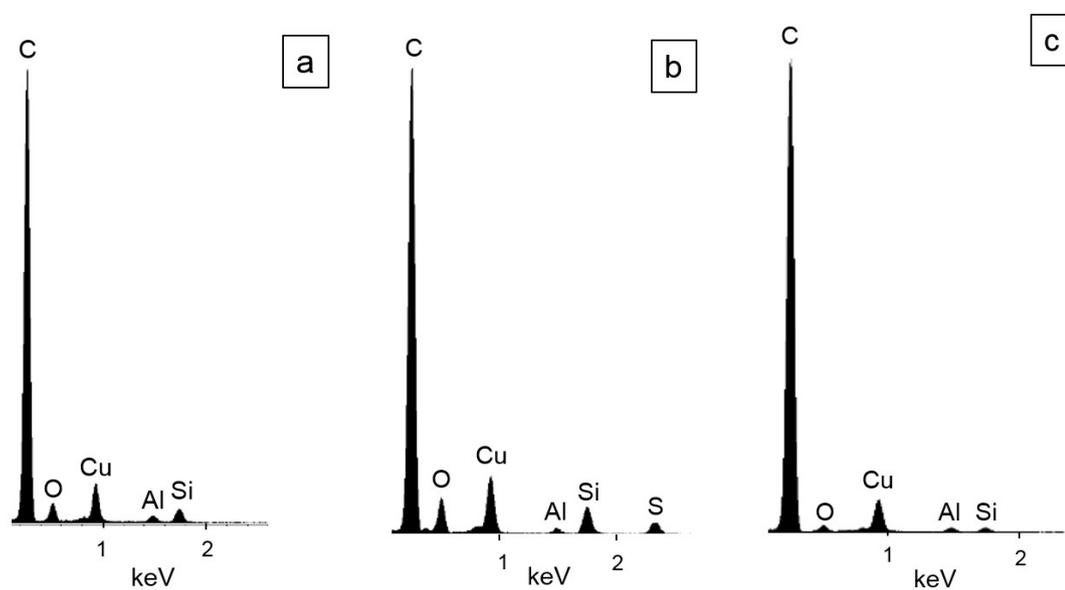
**Figure S2:** Number concentration for selected mobility diameters as a function of time in the Acheson Furnace Hall.



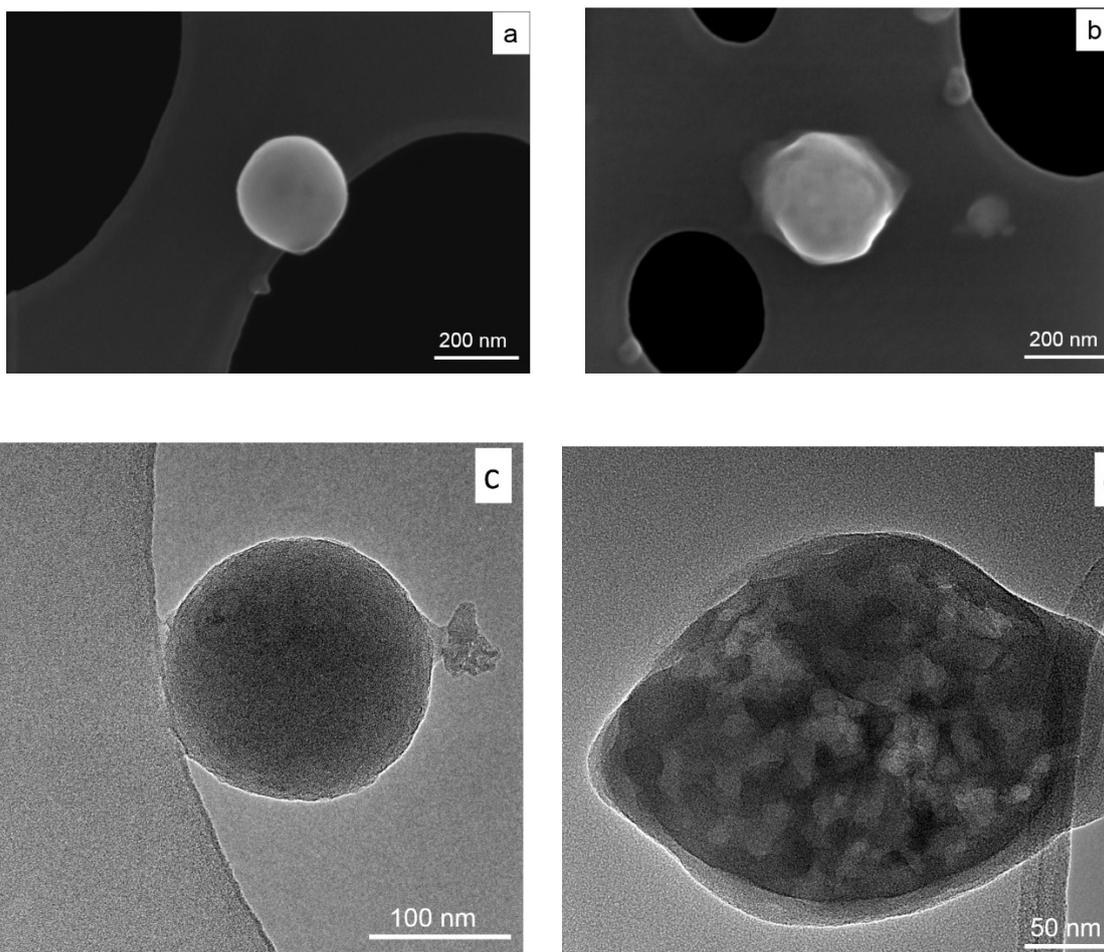
**Figure S3:** TEM image (a), HRTEM image (b), and corresponding EDX spectrum (c) of a carbonaceous particle identified as petroleum coke. The Cu signal is from the Cu-grid.



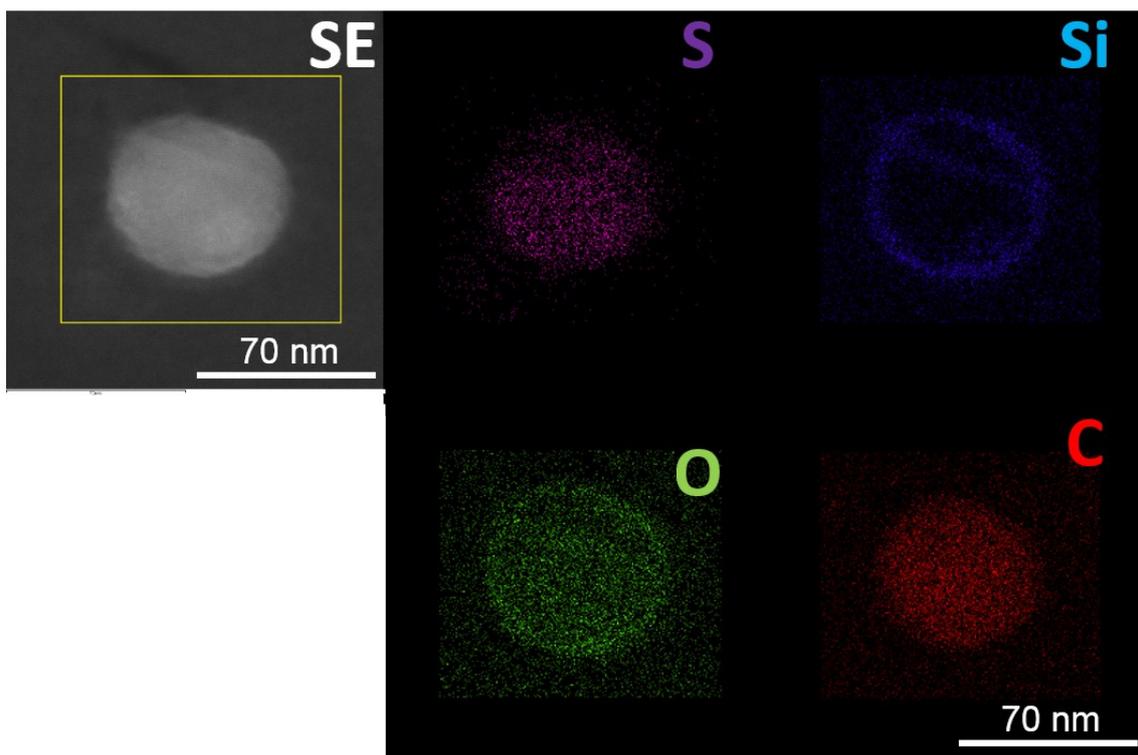
**Figure S4:** SEM image (a), EBSD (b) and EDX spectrum (c) of a graphite particle. The signals of Cu and Al are from the Cu-grid and the sample holder, respectively.



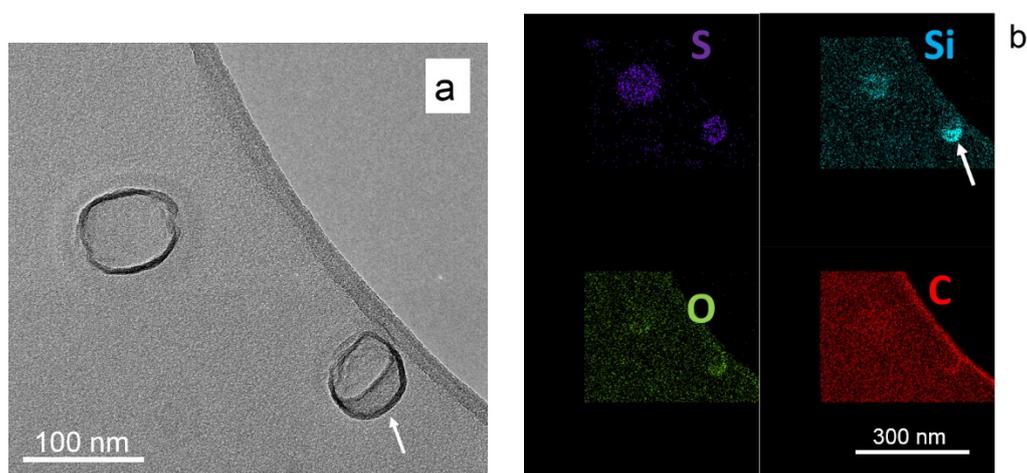
**Figure S5:** EDX spectra (a– c) of the soot particles shown in Figure 6 a – c, respectively. Signals of Cu and Al are from the Cu-grid and the sample holder, respectively.



**Figure S6:** SEM images of spherical C-rich particles interpreted as tar balls (a) and C-spherical type 2 particles (b). TEM images of a tar ball (c) and C-spherical type 2 particle (d).



**Figure S7:** STEM image of a C-rich particle interpreted as a TB (a) and corresponding element distribution images (b) for S, Si, O and C.



**Figure S8:** TEM image of S-rich particles with a border residue (a) and corresponding element distribution images (b) for S, Si, O and C.