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Atmospheric Measurement Techniques Discussions

Interactive comment on "Micro-physical properties of carbonaceous aerosol particles generated by laser ablation of a graphite target" *by* T. Ajtai et al.

Anonymous Referee #1

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This paper proposes a new method of formulating a new surrogate for atmospheric black carbon. This is an important issue that has confounded atmospheric chemistry and air quality for a while.

However, my main concerns with this paper are as follows:

- Table 1 suggests that there is no monotonic relationship between CMD and laser fluence, and little differences are seen in the size distribution under various conditions. That tells me some of these features that the authors discuss are just due to method variability. This needs to be discussed under a discussion of the method reproducibility, which is not presented here. This is a critical issue for suggesting a new BC surrogate.

- A 4-wavelength PAS (photoacoustic absorption spectrometer?) is shown in Figure

1, but no data presented. While the size and shape of some of the particles may be similar to that of atmospheric BC, we need to know the particle optical properties.

- Do the authors assume the generated particles are pure carbon? They should at least present some results from basic thermal-optical OC/EC analysis if not more sophisticated instruments like the single particle soot photometer (SP2). Does the use of synthetic air as carrier gas result in oxidized carbon, so the mass is no longer "pure BC" if it was so with nitrogen?

Other issues the authors may want to consider are:

- How will the generated material be stored and transported? Or does everyone need one of these laser ablation set-ups in their labs? (This is why fullerene soot and Aquadag are used widely, even though Kirchstetter's flame set-up produces more realistic BC.)

- How many TEM images have the authors taken? How reproducible are the fractal shapes at larger sizes?

I cannot stress this enough – reproducibility of the generated particles is a critical issue for BC surrogates. This and other issues raised above need to be addressed before the manuscript can be considered for publication.

Two papers discussing the generation of BC and the characterization of BC surrogates that may serve as a model to the authors are:

Kirchstetter, T.W.; Novakov, T. (2007) Controlled generation of black carbon particles from a diffusion flame and applications in evaluating black carbon measurement methods. Atmos. Environ., 41, 1874-1888, doi:10.1016/j.atmosenv.2006.10.067.

Gysel et al. (2011) Effective density of Aquadag and fullerene soot black carbon reference materials used for SP2 calibration. Atmos. Meas. Tech., 4, 2851-2858, www.atmos-meas-tech.net/4/2851/2011/

Specific comments:

Line 20: “strong but featureless” optical absorption properties? Please explain what “featureless” means in this context.

Table 1: no monotonic correlation between laser fluence and CMD of primary particles, though particle concentration increases with fluence.

Figures 2 and 4: what do the error bars represent? Variability over time? Or standard deviation over several runs?

Figure 7 needs a more descriptive caption.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 10159, 2014.