Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2018-390-RC1, 2018
© Author(s) 2018. This work is distributed under
the Creative Commons Attribution 4.0 License.

Atmospheric Measurement Techniques Discussions

Interactive comment on "Spectral Intensity Bioaerosol Sensor (SIBS): A new Instrument for Spectrally Resolved Fluorescence Detection of Single Particles in Real-Time" *by* Tobias Könemann et al.

Anonymous Referee #1

Received and published: 25 November 2018

The paper describes an instrument that should be much superior to the WIBS or UVAPS in characterizing fluorescent aerosol. The 16-channel fluorescence spectra should provide far more information for characterizing aerosol than existing WIBS instruments, while still measuring very large numbers of spectra per day. This instrument appears to be able to significantly expand our understanding of bioaerosols and other fluorescent particles in the atmosphere. The paper is clearly written. It should be published. I suggest the authors think about the following.

1. The title and abstract say, "a new instrument for . . ." Then line 144 is: "Introduced

Printer-friendly version

Discussion paper

here is a new instrument for the detection and characterization of individual particles; the Spectral Intensity Bioaerosol Sensor (SIBS, Droplet Measurement Technologies)." Then later the text says, "The SIBS was originally designed and marketed to record time-resolved fluorescence lifetime." If it has already been marketed, the use of "new" seems possibly inaccurate. How long has it been marketed? I suggest dropping "new" from the title and the text. There is no need for it. Also, a book chapter by Huffman (one of the authors of the present paper) and Santarpia, "Online Techniques for Quantification and Characterization of Biological Aerosols," in Microbiology of Aerosols eds., Anne-Marie Delort and P Amato (2017) mentions both types of SIBS (the breakdown spectroscopy SIBS and the spectral intensity SIBS). That chapter was published over a year ago and was presumably written many months before that.

2. A new and noteworthy part of this paper (maybe the most new and noteworthy part) is that the instrument is commercially available. Instruments that could do the key parts of what is done here (two fluorescence spectra each with a different excitation-wavelength is measured for each particle) have been around for some years, e.g., Huang, Pan et al., and Pan et al. But routine measurements were far from feasible by others. I suggest stating in the abstract and introduction that the instrument is built by DMT and commercially available. I suspect more people will read it if they know they could buy one. Many instruments described in papers, especially new instruments, can only be used by the researchers that built and know how to use them.

3. RE: "originally designed and marketed to record time-resolved fluorescence lifetimes". Are spectra required for measuring fluorescence lifetimes? Was the SIBS designed and marketed to measure spectra at two excitation wavelengths? I think what is meant is: It was designed and marketed to measure time- and spectrally-resolved fluorescence lifetimes.

4. Make Fig. 2 higher resolution so it can be seen in detail on a large monitor.

5. SIBS (Spark Induced Breakdown Spectroscopy) already has a meaning in the mea-

Printer-friendly version

Discussion paper

CC BY

surement of aerosol particles, either single particles or many at a time. It is confusing to see SIBS used for the name of an instrument that has nothing to do with spark induced breakdown. SIBS (original meaning) provides information similar to LIBS, i.e., elemental composition of single-particles or multiple-particles. I imagine SIBS (or LIBS) may eventually be combined with an instrument such as the SIBS described in this paper, to provide both breakdown spectra and fluorescence spectra for each particle. Since the SIBS of Konemann et al., is already marketed, and been around for a while, it is likely too late for this comment to be relevant, but I hope not. Some papers on SIBS for aerosol detection:

Spark-induced breakdown spectroscopy-based classification of bioaerosols, A J Ray Bauer and D M Sonnenfroh, 2009 IEEE International Workshop on Safety, Security & Rescue Robotics (SSRR 2009)

Preliminary correlations of feature strength in spark-induced breakdown spectroscopy of bioaerosols with concentrations measured in laboratory analyses, Shmidt, Morgan S., Bauer, Amy J. Ray, APPLIED OPTICS, 49, C101-C109 (2010) DOI: 10.1364/AO.49.00C101

Amy J.R. Hunter , Joseph R. Morency , Constance L. Senior , Steven J. Davis & Mark E. Fraser (2000) Continuous Emissions Monitoring Using Spark-Induced Breakdown Spectroscopy, Journal of the Air & Waste Management Association, 50:1, 111-117, DOI: 10.1080/10473289.2000.1046398

Continuous dust monitoring and analysis by spark induced breakdown spectroscopy, Khalaji, M., Roshanzadeh, B., Mansoori, A., Taefi, N., Tavassoli, S. H., OPTICS AND LASERS IN ENGINEERING. 50, 110-11 (2012)

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2018-390, 2018.

CC BY