

## ***Interactive comment on “A Humidity-controlled Fast Integrated Mobility Spectrometer (HFIMS) for rapid measurements of particle hygroscopic growth” by Tamara Pinterich et al.***

### **Anonymous Referee #1**

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This work reports on a new way to quantify aerosol hygroscopic growth factors. The authors introduce the Humidity-controlled water-based Fast Integrated Mobility Spectrometer (HFIMS). The topic of this paper certainly fits in this journal and the paper is very well-written and to the point. The new instrument is a good addition and highly relevant for ambient applications that require fast time resolution. The instrument provides some advantages over other recent instrument designs that conduct growth factor measurements. Characterization tests were performed that show that the instrument can accurately quantify growth factors and deliquescence/efflorescence RH values for a known inorganic salt. The authors can strengthen their manuscript by demonstrating that the instrument works well on a mobile platform. If this is not possible for some

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reason, the authors should mention why this is not possible; from what i can tell, the field data shown were from a stationary set-up.

Specific Comments:

Figure 2: "Sheat flow" spelled wrong (Sheath)

The authors should provide a clear statement about the range of dry diameters the instrument can handle for the growth factor measurement. is it 35-165 nm as Lines 6-7 suggest on page 6? state it clearly and compare it to other available instruments. it is nice that it can detect smaller sizes where there may be higher concentrations, but it may be useful to point out that larger sizes may be more relevant for light-scattering and radiative forcing? For what purposes are smaller sizes most relevant (e.g., health effects)?

A few times it is stated that "...size distribution spanning a factor of  $\sim 3$  in particle diameter". Rather than using the confusing "factor of  $\sim 3$ " everywhere, can the authors simply just state the range of diameters?

What is the residence time of aerosol in different parts of the instrument?

How long does it take to scan through a range of different relative humidities? Provide numbers and compare to other instruments.

What is the range of relative humidities the instrument can handle?

Section 2.1: Can the authors comment on hysteresis effects that are common with nafion based systems?

Has the instrument been deployed on a mobile platform? The paper states that the instrument is ideal for mobile platform work but it is unfortunate that data does not appear to be shown from its use in the field to give readers a better sense of how robust it is when the conditions aren't 'easy' such as in a lab or at a stationary field site.

Figure S2: x-axis has "distance" misspelled.

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