This manuscript “Nano-hygroscopicity tandem differential mobility analyzer (nano-HTDMA) for investigating hygroscopic properties of sub-10 nm aerosol nanoparticles” presents a design of a HTDMA to measure the hygroscopicity particle down to ~6 nm. The performance and the methods to calibrate and validate the setup were also reported. This setup was shown to have low sizing offset (<1.4% for 100 nm particle). High accuracy for flow rates of aerosol and sheath flow (±1%) and high accuracy for voltages applied to DMA (±0.1%) were found to be crucial to achieve the low sizing offset. Also the DMA2 and humidification system were designed to be placed in housing with stable temperate (±0.1K). The RH of sheath flow was set to the same as RH of aerosol flow to prevent the pre-deliquescence. Using this setup, the authors measured the deliquescence and the efflorescence RH as well as the growth factors of ammonium sulfate and sodium sulfate. For ammonium sulfate, no significant size dependence of DRH and ERH was observed while clear size dependence was observed.

Determining the hygroscopicity of nano-particles is important to understand aerosol-water interaction and provides constraints on the chemical composition of nano-particles. This nano-HTDMA has excellent performance and will be useful to measure hygroscopictiy of atmospheric nano-particles. The manuscript is well-written and fit well the scope of AMT. I recommendation its publication in AMT after addressing the following minor comments.

Minor comments

1. What is the smallest particle size that the HTDMA can measure?
   The title “Nano-hygroscopicity tandem differential mobility analyzer (nano-HTDMA) for investigating hygroscopic properties of sub-10 nm aerosol nanoparticles” reads a little redundant for me. In addition, the manuscript discusses many experiments for particle >10 nm. I suggest optimizing the title.
2. Line 428-434, and Fig. 8d, the same method, electrospray was used to generate aerosol <20 nm in this study and the study by Biskos et al. 2006. But the results (growth factors) are still different. Can the authors discuss the difference? Is it possible to generate particles of the same size, i.e. 20 nm with different methods and compare the GF?
3. Fig. 5 and Fig. 7, can the author discuss why the 6 nm AS showed a slight increase with increasing RH.
4. Fig.7, why the DRH for 20 nm AS is different from others (the dashed line)? Also the coloring of efflorescence and deliquescence in this panel contradicts the caption.
5. Line 375-376, “double-mode phenomenon was not observed 375 for 8 and 6 nm ammonium sulfate nanoparticles” . Is this because of the slower mass transfer of water vapor for larger particles?
6. Line 472-474, why does DRH/ERH of sodium sulfate show a clear size dependence while ammonium sulfate does not?

Technical comments

1. Line 347, “excuses air” or “excess air”?
2. Line 427, “continues” should be “continuous”.
3. Line 470, “sensitivity” should be “sensitive”.
4. Fig. 5 and 6, I suggest explaining the red and blue lines in the captions, although they were explained in the main text.