

Increased Throughput and Charge Measurements from a Miniaturized Dual Sector Design for Charge Detection Mass Spectrometry

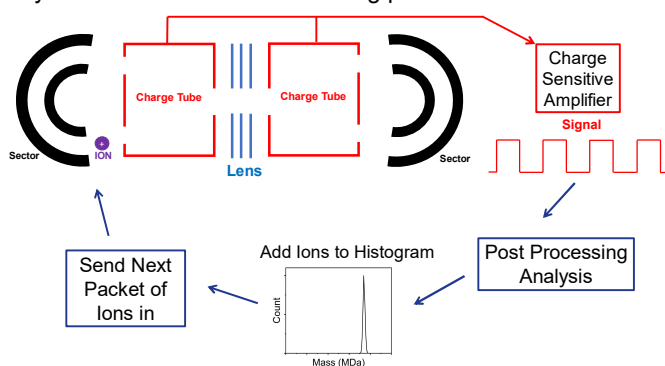
Raj Parikh, Alexey Barkhanskiy, Gavin Wray, Richard Chapman and John B Hoyes
TrueMass, Manchester, UK and Amsterdam, NL

Miniaturized Design

The first generation TrueMass Analyzer was redesigned and reduced in size by a factor of 3x. Mk2 improvements:

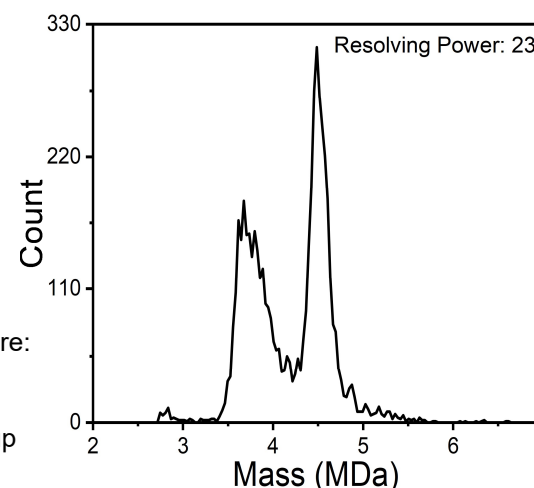
- Capacitive load reduced – better S/N
- Ion frequency increased 3x – less 1/f and vibrational noise
- An electrostatic quad lens was added – equal sensitivity to Mk1 despite significantly smaller size.

These modifications increased the throughput of the overall system as well as mass resolving power.



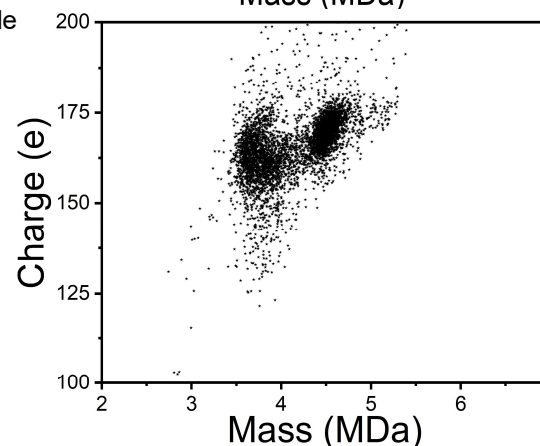
AAV9 Empty-Full

- AAV9 full capsid was purchased from Virovek and run on the Mk2 instrument, and the following results were obtained.
- Here we see the ability for the Mk2 Analyzer to distinguish between empty and full capsids with high resolution for the analyzed system allowing for robust, consistent analysis of AAV.



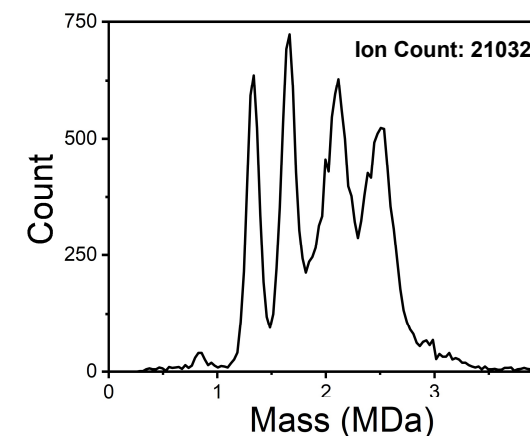
AAV Results are:

- Quickly Measured
- Easy to setup
- Robust
- Reproducible



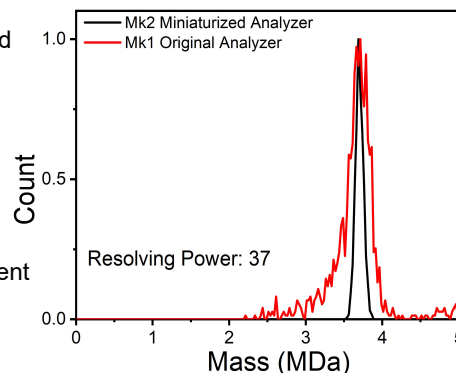
Higher Throughput

- To test Mk2 throughput capabilities a sample bacteriophage Q β was run which spans a large true mass range to test the robustness of both the instrument's charge capacity as well as algorithmic improvements.
- From this test we observed sample rates of 10 ions/transient when in high throughput "Accumulate/Inject/Trap" mode, this will be further increased by optimization of the duty cycle of the front-end system. An example spectrum is shown below.



Increased Mass Resolving Power

- AAV5 was collected and analyzed
- Mass resolving power increased from 13 to 37
- AAV5 data was collected for transient lengths of 1s at a rate of 4ions/transient



Conclusions

With the realization of the Mk2 analyzer, the capabilities of the TrueMass CDMS instrument have been clearly demonstrated with great performance and breadth of sample analysis.

In the future, applications of our instrument on both other front-end systems will be depicted as well as with other hyphenated technologies on varying biological systems to show the versatility in its applications.