Improved analysis of biopharmaceutical samples using an MS-only Orbitrap mass spectrometer

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Overview

Purpose: Improve the performance of Orbitrap HRAM systems for analysis of biopharmaceutical samples, monoclonal antibodies.

Methods: Full-face analysis of very complex samples and biopharmaceutical samples by monitoring the Orbitrap assembly, enhancing the instrumentation and improving the spectral data analysis.

Results: Significant increase of data quality of intact proteins is accomplished with the instrument of the third generation based on the demonstration of significant improvements to the detection system, but not to the detection efficiency. As a result, the response time of the detection system has been reduced from ~10 ms to under 1 ms, as demonstrated in Fig. 3.

Introduction

In the analysis of complex mixtures, such as biopharmaceuticals, the requirements for mass spectrometers are very high. The ability to achieve this is limited by the resolving power of the mass spectrometer, but also by the detection system. The sensitivity of the detection system is crucial for obtaining high-quality mass spectra. The improvement in the sensitivity of the detection system has been demonstrated in this study.

Results

Method Improvements

Since the image current detection employed in the Orbitrap detection is an important factor in the detection of intact proteins, the implementation of a new detection system has been proposed to improve the sensitivity of the detection system. The new detection system has been shown to improve the sensitivity of the detection system by several orders of magnitude.

Measuring large molecules

Although voltage shorting during ion injection into the Orbitrap analyzer decreases the image current signal, the implementation of the new detection system has been shown to improve the sensitivity of the detection system by several orders of magnitude.

Figure 3. Best pattern from the FT signal

Figure 4. New versus old image line of the detection system

Figure 5. Calibration mixture of C18

Measuring large molecules

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Conclusion

We have shown that the novel Exactive Plus instrument is capable of detecting large intact protein complexes. The very high sensitivity and accurate mass measurements are demonstrated by detecting intact complexes of up to 100 kDa, as well as detecting intact complexes of up to 1 MDa, as demonstrated in Fig. 3.

References


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