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Method and System for Improved Sensitivity and Measurement in Triple Quadrupole Mass Spectrometer Systems

SUMMARY

Triple quadrupole mass spectrometry systems have typically been the workhorse of targeted compound analysis. In particular, it is often used in detection and measurement of low abundance compounds in complex biological matrices. In spite of its analytical advantages and wide spread use, additional improvements in its limit-of-detection capabilities are always beneficial.

PNNL's ion funnel technology is a well known and demonstrated means to increase ion transmission efficiency. However, the new technology described here has been demonstrated to provide a 4 to 8-fold increase in limits-of-detection compared to a single ion funnel operating in continuous transmission mode. It does so by utilizing efficient Rf trapping of ions within a particular mass range in a high-charge capacity ion funnel trap. Ions below the mass range of interest are released through the quadrupole assembly. Ions in the mass range of interest are then collisionally activated in the second quadrupole to form fragment ions. Selected fragment ions are then resolved in a third quadrupole according to their mass-to-charge ratios. In addition to substantially improving the limits-of-detection, the method and system also provide a very high duty cycle leading to high-throughput analyses.



U.S. DEPARTMENT OF
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