



timsTOF™

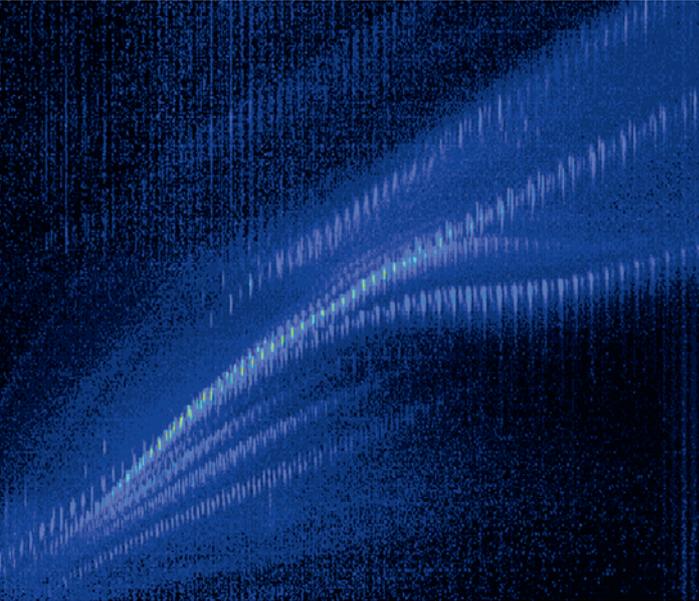
- Flexibility to Empower Your Ideas

Innovation with Integrity

TIMS-QTOF MS

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Ion mobility is a powerful extension to mass spectrometry that delivers information on the three-dimensional structure of an ion, and increases peak capacity and confidence in compound characterization.

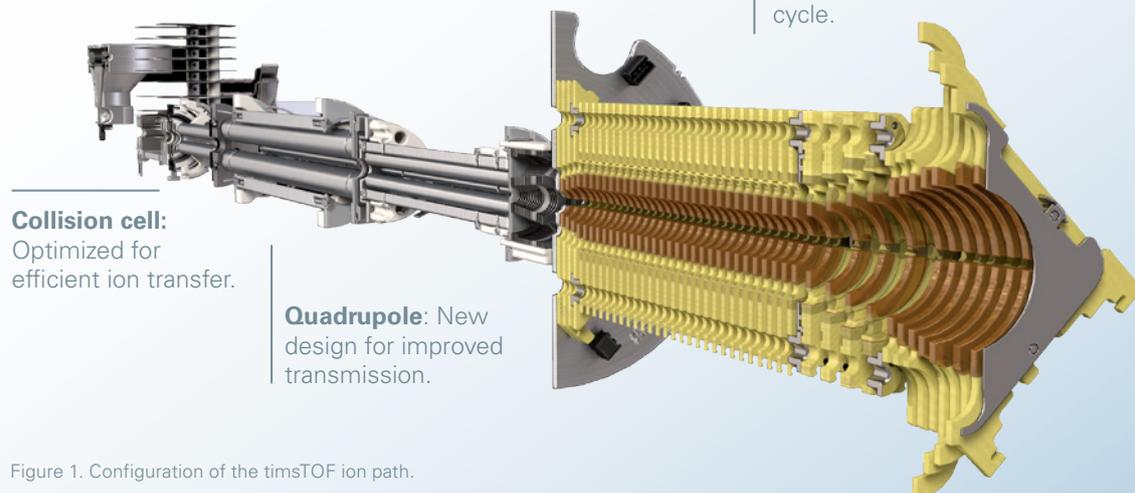
With timsTOF™, Bruker introduces the next generation of ion mobility-mass spectrometry.

timsTOF was engineered by Bruker experts as an open platform to accelerate the adoption of ion mobility-mass spectrometry analysis across research applications. All that is missing are your expertise and curiosity.

What is TIMS? In Trapped Ion Mobility Spectrometry (TIMS), ions are propelled through the TIMS tunnel by a gas flow. An electrical field controls each ion from moving beyond the position where the push that it experiences from the gas flow matches the force of the electrical field. Ramping down the electrical field allows selectively releasing ions from the TIMS tunnel according to their mobility.

TOF analyzer: 50,000 resolving power without compromise in sensitivity or acquisition speed.

TIMS tunnel: High resolution ion mobility separation (up to 200) with parallel accumulation capability for up to 100% duty cycle.



Collision cell: Optimized for efficient ion transfer.

Quadrupole: New design for improved transmission.

Figure 1. Configuration of the timsTOF ion path.



The flexibility to view samples the way you want.

timsTOF combines high ion mobility resolution, powerful QTOF performance and a unique set of features to inject flexibility into your analytical workflow.

Additional separation, additional insights

Augment sample separation beyond chromatography and time-of-flight with trapped ion mobility separation in between. The unique principle underlying **TIMS** achieves high resolution, and its compactness allows switching it on and off without penalty in time or sensitivity.

More control, more answers

Powered by **imeX Technology**, the ion mobility resolution of timsTOF can be adjusted during data acquisition to magnify compounds of interest and examine them in detail.

Your research questions, your analysis tools

Data files acquired on timsTOF have an open format (***.tdf**) that supports transparent and tailored analyses based on open source SQLite. Make the most of your data and design your own software tools to carry out meaningful analyses and visualize data in novel ways.



The resolution to reveal the full depth of a sample.

With high ion mobility resolution of up to 200, timsTOF unravels the complexity of samples and unlocks insights that remain hidden in standard mass spectrometry.

With high resolution ion mobility separation timsTOF adds an orthogonal dimension that increases peak capacity beyond the resolving power achieved by chromatography and time-of-flight. When insufficiently resolved precursor ions prevent conclusive fragmentation analysis,

timsTOF produces MS/MS spectra with significantly less background noise, enabling more confident and specific identification. Even isomeric and isobaric compounds become accessible.

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Dr. Carlos Afonso, University of Rouen:

We are already using ion mobility in our lab, but with the much higher ion mobility resolution that timsTOF provides now, there is a lot of room for different applications based on this technology.



Maximize insights.

Analyze samples in survey mode for an overview and investigate a resulting heatmap interactively. Then, select an **imeX mode** to magnify a specific mobility range. Focusing on a target set of peaks, you can perform an accurate analysis of collisional cross sections or resolve overlapping ions with ultra-high ion mobility resolution.

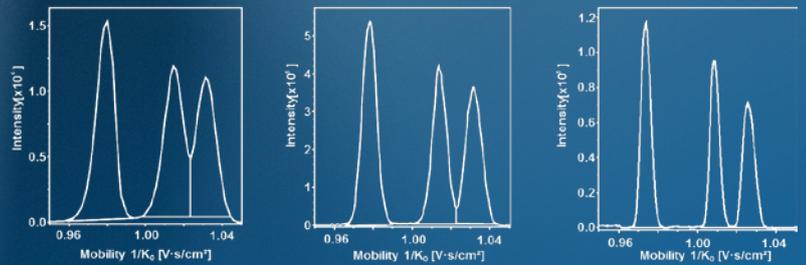


Figure 2: Raffinose, Melezitose and Maltotriose have the same elemental composition $C_{18}H_{32}O_{16}$, but differ in their structure. imeX technology allows adjusting ion mobility resolution in three steps. Here, ion mobility resolution up to RP 80 (left), up to RP 120 (middle) and baseline separation with up to RP 185 in imeX Ultra mode (right) was achieved.

Confidence through unprecedented detail and clarity.

timsTOF boosts confidence and specificity of compound identification with an expanded set of orthogonal qualifiers that are measured with great accuracy.

timsTOF increases the depth of your LC-MS/MS workflow by adding high resolution ion mobility separation. Keep your established chromatography settings and investigate data in the usual way, e.g. create a Base Peak Chromatogram (BPC) of a compound of interest.

Further investigate the mobilogram and heatmap to discover potentially overlapping compounds. imeX technology will reveal isomeric molecules that you may not have even expected in your sample.

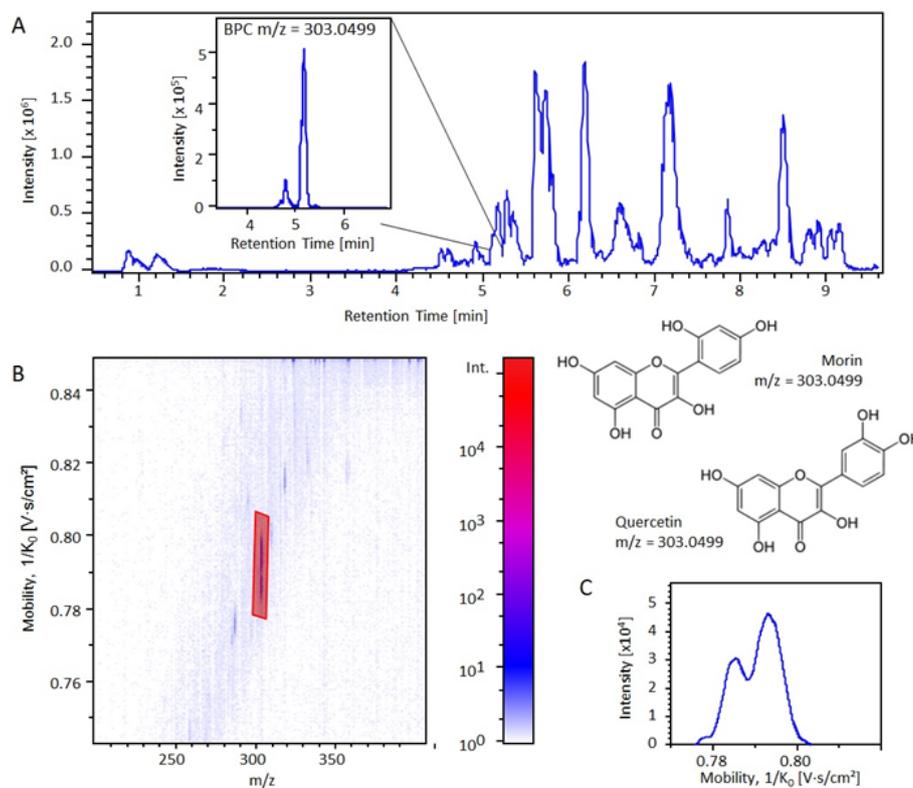


Figure 3. imeX™ technology in an LC-MS/MS workflow. A. Chromatographic separation of propolis sample and BPC of quercetin, m/z = 303.0499 Da (insert). B. The heatmap view of the analysis displays a broad peak in the mobility dimension, potentially indicating overlapping compounds at m/z = 303.0499 Da. C. imeX Ultra technology facilitates straightforward separation of two isomeric compounds with high ion mobility resolution.

Expand what you know about a compound

With timsTOF, you can construct enhanced libraries of compounds, where each entry is characterized by ppm accurate mass, collisional cross section (CCS) with a precision of < 0.5%, and Bruker's unique isotopic pattern fidelity (True Isotopic Pattern or TIP).

Clean fragmentation spectra that are easily correlated with their precursor ion support conclusive compound identification. Ultimately, this expanded set of orthogonal characteristics for every ion grants greater analytical flexibility and confidence.

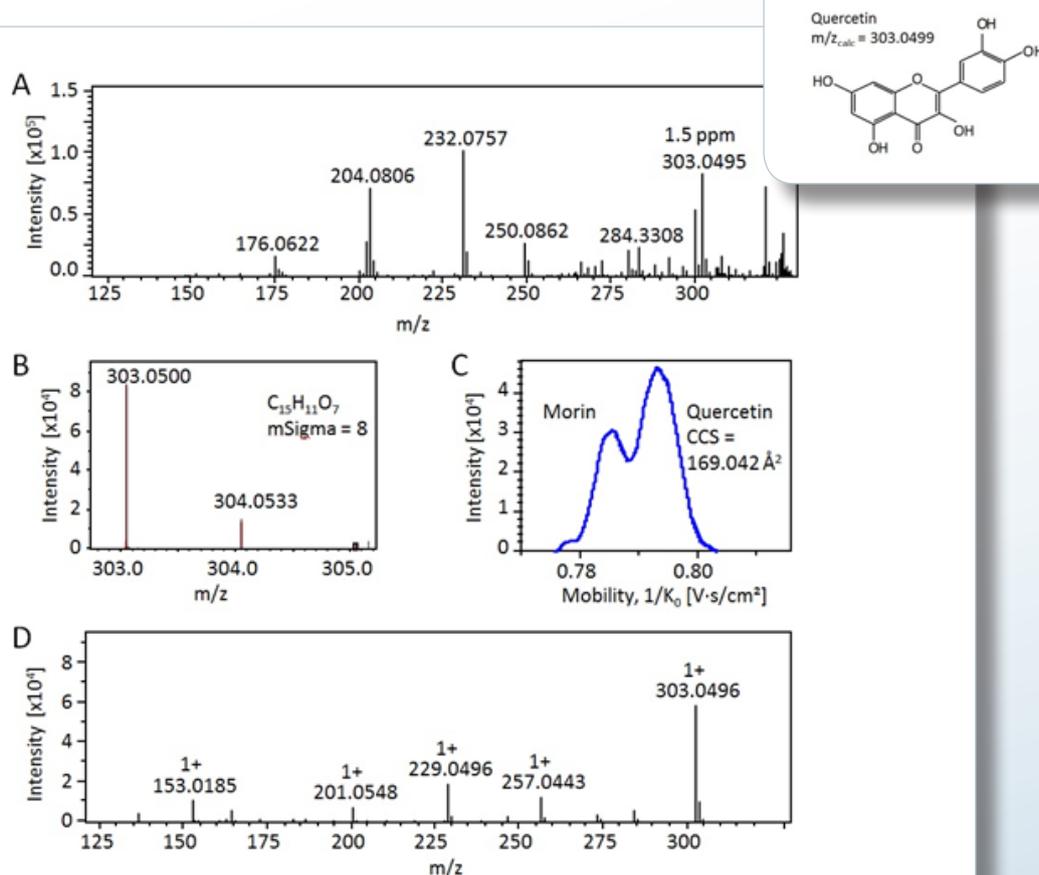
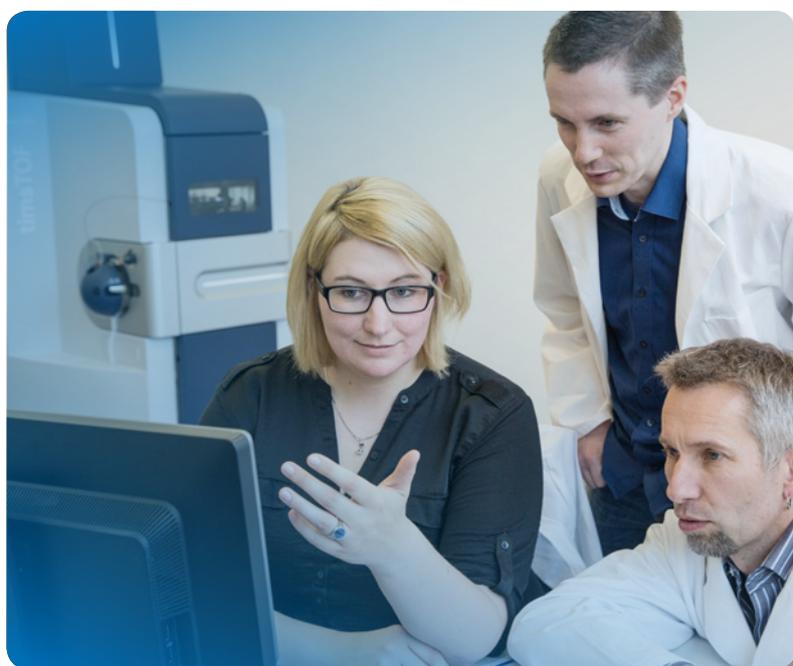


Figure 4. TimsTOF increases confidence in compound identification. A. MS spectrum of a compound mixture containing quercetin ($C_{15}H_{11}O_7$) with $[M+H]^+ = 303.0495$ Da. B. The theoretical isotopic pattern of quercetin is shown, with the exact mass and isotopic pattern quality reflected in the mSigma value. C. A targeted MS/MS spectrum acquired after TimsTOF separation displays quercetin fragment ions. D. The mobilogram reveals an isomeric compound in the mixture (morin) and enables determining the CCS value of quercetin.

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// **Dr. Jan Jordens, DSM Resolve:** *timsTOF gave us much more complex data right from the beginning, so we saw information that we did not even expect in the data. Now the platform really helps us to get new knowledge about processes that are taking place in our samples and also about impurities.*



Flexibility

Resolution

Confidence

For research use only. Not for use in diagnostic procedures.

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