The SCiLS™ autopilot – a new workflow facilitating MALDI Imaging measurement set-ups

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Introduction

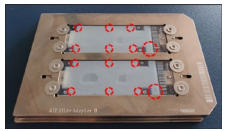
The SCiLS autopilot is a new software workflow that simplifies MALDI Imaging measurement set-up on the timsTOF fleX through automation for reliable and robust results.

Methods

Automated workflow

- Prepared slide and scanned image
- Selection of sample image based on barcode
- Scanning of reference fiducials
- Target profile calculation
- Automatic focus tuning (on matrix)
- Automatic m/z-calibration (Calibrant position)
- Automatic tissue detection
- Ready for acquisition

Results

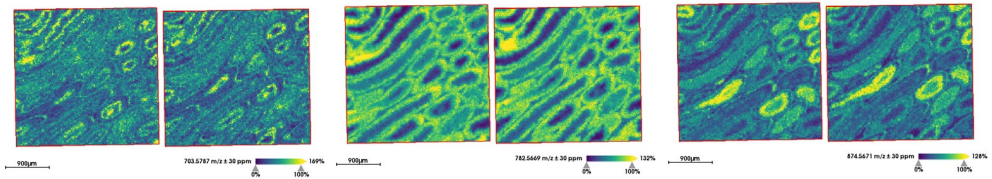


Slide adapter with two prepared IntelliSlides indicating the areas for automatic target profile determination and laser focus tuning (red circles).

m/z calibration
Three lipid standards were sprayed on IntelliSlides and the mass error determined in four independent measurements. The mass error for the protonated and sodiated forms was below 2 ppm.

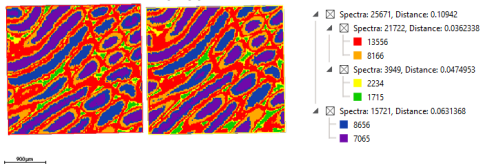
We compared the outcome of an imaging run using the automated workflow with the results of a run starting the acquisition manually by an experience user.

automatic manual automatic manual automatic manual



Representative ion images of a rat testis dataset measured on the timsTOF fleX in the lipid range with 20 µm pixel size using either the automatic or the manual workflow to set-up the acquisition. The ion intensities and distibutions are similar in both cases.

automatic manual



Segmentation map of the lipid imaging dataset after automatic and manual acquisition set-up demonstrating that the tissue type is the main discriminating factor rather than the acquisition set-up method.

Conclusions

The SCiLS autopilot:

- Allows sample tracking based on permanently inscribed barcode.
- Enables easy operation that limits user input to a few key parameters.
- Stands for increased reliability and robustness due to less user introduced errors.
- Includes an integrated IntelliSlide workflow for automatic registration of reference fiducials.
- Contains automated algorithms for controlled instrument performance.
- Allows automatic tissue detection.

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