

University of Waterloo Mass Spectrometry Facility (UWMSF)


Bruker Autoflex Speed Standard Operating Procedure (SOP)

READ & UNDERSTAND THE ENTIRE SOP BEFORE BEGINNING

Note: An SOP cannot cover all the needed information for proper instrument understanding and operation, or cover all scenarios; nor can an SOP eliminate the necessity of awareness, attention to details and most importantly using your training to allow successful completion of your project. Background information regarding ionization methods, ion separation, techniques and concepts as well as tips and tricks can be found on the UWMSF website:

<https://uwaterloo.ca/mass-spectrometry-facility/ms-tutorials>

Remember, the training you have received and the detailed protocol you have developed and documented will provide the guidance necessary to allow you to complete a successful sample analysis or project using this sophisticated instrument. Please refer to the instrument manuals for other background information, review literature, and always remember your training. When in doubt always ask Facility personnel before trying something outside of your training or prepared protocol.

Name	Bruker Autoflex Speed	
Description	Reflectron and Linear ToF system with MALDI ionization	
Location	C2-268	
SOP created	January 7 th , 2020	
SOP author	Richard W. Smith	
SOP revised	January 7 th , 2020	
SOP revised by	Dr. Richard W. Smith	
SOP Location	C2-268	
User Manual	In wall cabinet in C2-268	
Equipment owner	UWMSF	
Authorized Trainers	Dr. Richard W. Smith (RWS) and Valerie Goodfellow (VG)	
Authorized Users	Users who have completed the UWMSF Training Certification and all other relevant UW specified safety training	

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Significant Hazards	High Voltage (up to 20kV AC/DC) and high temperatures (up to 200°C) are present in source and internal instrument components and power supplies. A Nd/YAG UV laser is used for MALDI and is secured behind instrument panels that should NEVER be opened by users only by RWS, VG or Bruker service personnel. Categorized as a Class I laser with panels closed and a Class IV with doors open and instrument operating.
Administrative Controls	Can be used independently by users who have satisfied all training requirements described above. Other users must be accompanied by an authorized trainer. Instrument panels and interlocks should never be removed by users only by RWS or VG when deemed necessary by RWS or VG.
Engineering Controls	Instrument is fitted with a protective housing and interlocks that prevent contact with high voltage/temperature components/MALDI laser.
PPE Required	Gloves, eye protection, lab coats and closed toe shoes when appropriate
Relevant MSDS	See chemical inventory binder for relevant MSDS's

Accident Procedure	Report immediately to Dr. Richard Smith and/or Valerie Goodfellow. Follow all posted procedures in the laboratory.
Emergency Shutdown Procedure	In cases where the instrument behaves or sounds abnormal, report immediately to Dr. Richard Smith and/or Valerie Goodfellow. If not available, turn the instrument to OFF from the FlexControl page>Spectrometer Tab>High Voltage. Close all programs, shutdown the computer, turn off the instrument by turning the key on the front panel followed by the rocker switch on the back of the instrument. Only perform this operation under extreme conditions!

Pre-start Checklist	<ul style="list-style-type: none"> • You can book instrument time by emailing RWS or VG and requesting a time slot. You can view instrument schedules on the UWMSF website: https://uwaterloo.ca/mass-spectrometry-facility/instrument-schedule • Instrument tuning and calibration can only be performed by authorized trainers (RWS or VG) and should never be attempted by users unless completely familiar after training. • Check status lights on the Autoflex front panel, they should be as follows: Mains>green, System>Warm Up yellow, Target>Access green indicating that the instrument is in standby mode. Also, flexControl>Spectrometer Tab>High Voltage should be off (RED). • The instrument method file loaded will be the last one used so load your instrument method file. • When these conditions are met, turn on (flexControl>Spectrometer Tab>High Voltage – will turn GREEN) • You have a sample introduction method, instrument method, ionization mode and polarity that you want to use.
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The Autoflex is used in batch introduction mode exclusively:

1. By mixing your solubilized sample with an appropriate MALDI matrix (with or without an additive) – usually used for pre-purified samples or simple mixtures.

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Solvents and additives used for mass spectrometry should be HPLC grade at a minimum but **LCMS grade solvents and additives would be the best choice.**

1. Start-up, Operating and Shut-down procedure

- Before any sample analysis is performed, it is critical to record the chemical noise (background) that your matrix and sample prep blank generate ie one of the samples you should analyze along with your samples.
- Solvents that can be used for MALDI are somewhat restricted but less so than ESI and this will be addressed in your training. Commonly used solvents are MeOH, MeCN, H₂O, acetone, THF, DMF etc mixtures with additives such as formic acid and silver salts for +ve ion.
- Place your sample on the MALDI plate, allow to dry, introduce the plate into the instrument. Acquire the spectrum (flexControl) and using flexAnalysis, analyze your data as described in your protocol that you have written during your training.
- There are MANY variables in this process and as these are sample and experiment dependent, the exact instrument setup will be tailored to your requirements during the training that is necessary before **ANY** analysis is attempted.
- When you have finished your analysis, place the instrument in Standby by clicking the High Voltage button on the Spectrometer Tab – it will go RED.
- Record your usage in the Logbook – you have completed your analysis and can leave the instrument for the next user.

Clean-up

- Remove all your samples and waste from the Facility
- Tidy up lab and bench space

Maintenance and Repair

- Do not attempt to repair any problems you encounter during your time in the Facility. Typical problems that can arise include, computer crashes, poor performance, poor mass accuracy or precision, vacuum problems etc
- It is important that you are able to determine that there is a problem, again your training will help you with this.
- If any of these or other situations arise that you don't understand, please find/talk with RWS or VG