المواصفات الفنية ٣- رقم ملحق

LOT 1

UV-Visible Spectrophotometer :
Only brands from Europe, North America, or Japan are acceptable.
UV-Visible range scanning spectrophotometer System should have the following measurement modes ~ Live Display in Abs, %T or Concentration ~ Scanning ~ Fixed wavelength at multiple wavelengths with calculations ~ Quantitative Analysis ~ OD600 analysis ~ Kinetics ~ Programmable method library ~ Smart Start direct boot-up ~ System must feature a dual beam, Czerny-Turner optical system with internal reference detector ~Should have a Xenon flash lamp ~ System should have a dual silicon photodiode detectors ~ Wavelength Measurement Range must be between 190 and 1100nm ~ Wavelength Accuracy: ± 0.5nm ~ Wavelength Repeatability should not exceed ±0.2mn ~ Data interval when scanning: 0.2, 0.5, 1, 2, 5 nm ~ System must allow the following scan speeds: Slow, Medium & Fast - up to 1600nm/min ~ Photometric Display Range: -3A to +5A ~ Photometrric Linear Range -2A to +3.5A ~ Photometric accuracy ±0.002A at 0.5A. ±0.004A at 1A. ±0.008A at 2A ~ Spectral bandwidth = 2nm ~ Noise: ≤0.0002A at 0A; ≤0.0003A at 1A; ≤0.0004A at 2A @ 260nm and 500nm ~ Drift: <0.0005A/hr ~ Stray light @198nm <1.0%T; @220nm <0.05%T; 340nm <0.03%T ~Baseline Flatness ±0.002A

LOT 2

DSC-TG features
Only brands from Europe, North America, or Japan are acceptable.
- Basic system including a top-loading micro balance (digital resolution 1 µg, maximum sample load/measurement range 35 g including sample crucible), electric motor driven furnace hoist (basic system) - built-in furnace control and power supply - magnetic valves and gas frits for purge gas inlet to the sample as standard equipment - suitable for measurements under normal atmosphere, in dynamic and static inert gas atmosphere and can be evacuated down to 10E-2 mbar. - Proteus measurement and analysis software for data acquisition, storage and evaluation under WINDOWS. - Graphical interface, integrated detailed HELP system - Platinum furnace, temperature range 25 ... 1500°C - high temperature tube furnace with PtRh meander heater, - integrated protective tube for gas flow with stop valve, gas-tight heating - conductor chamber for optional protective gas operation of the heater, air-cooled double shell, integrated control thermocouple - TG-DSC sample carrier system, also for Cp determinations, complete with radiation shield and thermocouples type S - Cp-determinations up to 1500°C, 2 sample pans (Al2O3) with lids for temperature range 25 ... 1650°C
➢ Software - Operating system windows 10, full control. - Software extension Cp-determination, for data acquisition, storage and evaluation ➢ Features - Calculation and graphic presentation of Cp, temperature-dependent, ability to add additional measuring curves, Cp curve comparison - Tabulated printout or ASCII file export of the calculated values, along with the DSC raw data - Possibility of automatic determination of the sensor head sensitivity through evaluation of calibration measurements - Determination of single values of the Cp curve or DSC curves - Input routine for free definition of the Cp standard value tables

LOT 3

ATR-FTIR for solid samples coupled to IR microscope

General

- High end Research Grade Nanoparticle FTIR Microscope must be attachable to a high-end Research grade benchtop FTIR system **optimized for solid samples**
- FTIR Microscope should be of future proof design enabling rapid on-site swapping of detectors based on applications needs
- The FTIR machine should be of future proof design enabling rapid on-site swapping of interferometers, sources and detectors based on applications needs

Spectrometer features:

- System should feature Gold optics, for far IR, mid IR and near IR operations
- Should enable easy, on-site swapping of interferometers, detectors and sources.
- Should include a Ge-on-KBr beamsplitter
- Beamsplitter must feature continuous on-line alignment to ensure ultimate sensitivity and accuracy
- Fully sealed and mounted in the sealed/desiccated/purged zone
- All reflective optics permitting wide spectral range performance
- 0.09 cm-1 resolution with variable aperture
- Signal-to-Noise, 1 minute scan, Peak-to-Peak, 4 cm-1: 65,000:1
- Wavenumber Precision: Better than 0.0008 cm-1
- Spectrometer should include the following:
  - Four position source mirror
  - Long Lifetime Infrared Source
  - Tungsten-Halogen white light source
  - Mounts for J-port emission optics and Raman InGaAs detector
  - Three position Paraflect detector mirror
  - DLaTGS detector
  - Liquid N2 Cooled MCT-A Detector with CdTe window (11,700-600 cm-1)
  - ATR module to be permanently installed on the machine, outside the sample compartment, to simultaneously run ATR and transmission experiments.
  - Smart Transmission accessory
  - Complete purge system
  - Internal Validation wheel
  - Full transmission kit for liquid and solid sampling
  - Expandable with GC-IR and NIR modules
  - Ready to accept Raman Module
  - Compatible with TGA Accessory

Software:

- Software must be 64-bit enabled for enhanced data processing, large map and data size.
- Spectrometer must implement data integrity through a database infrastructure and utilize an audit manager application to keep data compliant and well-protected.
- Software must have the ability to produce reports with active spectra. And the reports must be stored in the database with date and time stamp
- The standard spectrometer software must include a library of over 9000 reference spectra and should have the flexibility to add non-expiring databases at any time during the lifetime of instrument.
- Software must provide options for selecting sample placement location on a slide.
- Software must provide option for normal and fast mapping for high-speed screening.
- Software must provide option to live view sample and the IR spectra at the same time on the same screen.
- Software must provide options to integrate point collection, line collection, area collection in the same map enabling users to measure multi-map data sessions.
- Software must have built-in option to perform particle analysis on full filters, with thousands of particles automatically
- Software must include Q-check, Multicomponent search, and Contaminant analysis as standard functionality
- Software controlled LED illumination in reflection and transmission modes
- Software controlled LED illumination through aperture

IR Microscope features:

- Microscope must have 20000:1 (guaranteed) signal to noise specification for 100 X 100 micrometer aperture in transmission.
- Microscope must generate high-quality IR data with better than 5 micron IR special resolution
- Microscope must generate high quality 1 micron visual special resolution
- Microscope must be Trinocular, equipped with a eyepieces and a Digital high resolution 5-megapixel Color camera, for producing outstanding visual images and mosaics.
- Auto focus and auto illumination functions
- Microscope must feature a continuous, high definition, view and collection, in reflection and transmission modes.
- Microscope must feature a full view motorized, computer-controlled aperture
- Microscope must feature a micro positioning stage
- Microscope must enable the performance of up to 10 spectra/second for mapping applications.
- Reflectance, transmission and ATR sampling modes with automated exchange
- Microscope must have option for eyepiece for easy viewing and sample placement.
- Microscope must be equipped with automated nosepiece for intelligent switching between visual and IR objective.

- Microscope must be able to use three objectives automatically, and must be able to accommodate optional 10X, 40X visible objective, 15X IR objective and grazing angle objective. Allowing users to see samples at best resolution, measure the IR spectra for thin and thick samples.
- Microscope must be able to withstand up to 5 kg sample weight and must accommodate 40 mm thick sample size allowing users to use large and heavy sampling.
- Microscope must have option for user interchangeable detectors to allow users the flexibility to change region of analysis between MIR and NIR.
- System should be supplied with an MCT-A detector (22pprox.. 7800–650 cm^{-1}), and must have options for LN-MCTB, TEC-MCT, and InGaAs detectors to be locally upgraded at a later stage:
- Microscope must have ability to use visible and IR polarizers automatically, hence avoiding handling of polarizers by users to prevent damage.
- Microscope must include three option modes of measurement Transmission, Reflection and ATR controlled via software and hence avoids any manual knobs.
- Microscope must be equipped with slide on germanium ATR, for easy access and tip cleaning.
- Microscope must be equipped with automated force control for ATR.
- Must be supplied with microscopy sample handling toolkit including tweezers, micro- needles, roller knife, multiple slides for mounting, pair of KBr windows, pin vise
- Should include performance check plate for transmission reflection and ATR
- Microscope must have ability to attach to FTIR spectrophotometer which is capable of FT-Raman, TGA-IR, GC-IR, NIR, FIR, VIS, and bulk ATR with a full-sized sample compartment.

The Microscope should include:

- 4X Glass Refracting Objective
- 15X 0.65 N.A. diffraction limited objective, with built-in dovetail mount for optional ATR
- 15X 0.65 N.A. diffraction limited condenser, permanently aligned and motorized
- 40X LWD glass infinity corrected Objectives
- Motorized Micro Positioning Stage
- Easy, open access to sample for manipulation
- ATR pressure sensor built-in (automated ATR Contact indication)
- Universal sample holder
- Liquid Nitrogen transfer dewar (1 Liter)
- 350-micron Ge Tip ATR accessory
- Gold Dual passport beam mirrors to connect the microscope to the FTIR machine
- Trinocular viewer
- Gold micro mounts (pack of 5)
- Gold coated sample slides (pack of 5)
- Dual zone purge accessories
- Advanced branded and factory tested desktop PC with 22inch flat panel monitor

Lot 4

UV-Vis with integrating sphere for solid samples and fluorospectrometer:

1- UV-Vis Spectrometer
2- Fluorescence Spectrophotometer

Only brands from Europe, North America, or Japan are acceptable.

1- UV-Vis Spectrometer

UV-Vis Spectrometer features:

- Optical Design should be Double Beam with sample and reference cuvette positions;
- System should feature an Application Focused Beam Geometry; Czerny-Turner Monochromator
- Spectral Bandwidth should be Variable: 1.0 nm; 2.0 nm; AFBG Microcell optimized; AFBG Fiber Optic optimized; AFBC Materials optimized
- Light Source should be Xenon flash lamp with a minimum of 3-year warranty
- Detector should be Dual Silicon Photodiodes
- System should feature the following Scan Ordinate Modes: Absorbance, % Transmittance, % Reflectance, Kubelka-Munk, log (1/R), log (Abs), Abs*Factor, Intensity
- Resolution should be >1.8 (Toluene in Hexane)
- Wavelength Range should be 190 –1100 nm
- Wavelength Accuracy: ± 0.5 nm
- Wavelength Reproducibility should be ≤ 0.055 nm
- Scanning Speed: <1 to 6000 nm/min; continuously variable
- Slew Speed should be above 30,000 nm/min
- Data Intervals: 10, 5, 2, 1, 0.5, 0.2, 0.1 nm
- Photometric Range should be > 3.5 Abs
- Photometric Accuracy: 1A: ± 0.004A; 2A: ± 0.008A; (measured at 440 nm; using neutral density filters traceable to NIST
- Photometric Repeatability should be ± 0.0002A
- Noise: 0A: ≤ 0.00015 A; 1A: ≤ 0.00025 A; 2A: ≤ 0.00050 A; (260 nm, 1.0 nm SBW, RMS)
- Drift: < 0.0005 A/hr (500 nm, 1.0 nm SBW, 1 hour warm-up)

Stray light: ≤ 1% T at 198 nm (KCl), ≤ 0.05% T at 220 nm (NaI), ≤ 0.05% T at 340 nm (NaNO2)

- Baseline flatness should not exceed ±0.0012 A
- Data acquisition should be to 100 Hz for single cell kinetics
- System should feature an adjustable cell holder for optimum cell positioning
- System should feature a numerous accessories for solid and liquid sampling
- Software should feature the below specifications:

- Software should feature a Live Display for real time single wavelength measurements or quick identification of a sample peak
- Includes a Quantification package
- Software should feature an Advanced Fixed wavelength analysis with graphical data display and user defined limits
- Integrated calculations provide more data per measurement in Scan, Fixed and Quant
- Wavelength scanning application with advanced tools for peak analysis and spectral processing
- Advanced kinetics features including multi-stage measurement, temperature ramping and comprehensive data fitting options

- Automated file export and e-mailing of data
- Seamless paper-based reporting with user defined parameters

Workbook and template scheme makes data organization easy

- ➢ System should Include:
- Single Position Cell Holder
- Software for Computer control of instrument and off-line data analysis
- USB memory device
  - ➢ Solid sampling accessories:
  - Sample Slide Holder and Baseplate-Det
  - Universal Sample Holder Slide
  - Magnetic Film Holder Sample Slide
  - 15° Specular Reflectance Accessory
  - 30° Specular Reflectance Accessory
  - 60° Specular Reflectance Accessory
  - Integrating Sphere:
    - 60mm Integrating Sphere w/Spectralon coating
    - Single beam
    - Transmittance and reflectance modes
    - Cuvette Holder to use with cuvettes in transmittance mode
    - Powder Cell Holder to use with powders in reflectance mode
    - Includes 1A mesh filter
- Alignment Block for Powder Cell Holder
- 1A Metal Mesh Attenuator
- Filter, 2 Abs Screen
- Diffuse Reflectance Standards 2 - 99%:
- 1-in. diameter 99%, 75%, 50%, and 2% reflectance standards
- Supplied w/calibration data from 250 to 900 nm
- An appropriate desktop PC and printer

2. Fluorescence Spectrophotometer features:

- Applications: Material Characterization, Analytical Chemistry, Life Science, Pharmaceutical, Academia, Industrial (LED analysis, solar cell analysis, dye analysis, etc.)
- Light source: 150W Xenon-Arc Lamp (Continuous Wave)
- Detector: Reference is Photodiode and Excitation and Emission Spectra: R-928 PMT
- Monochromator: 1,200 grooves/mm
- Slit width: Selectable: 0.5, 1, 2.5, 5, 10, 20 nm (for both excitation and emission)
- Wavelength range: 190 – 900 nm (for both Excitation and Emission)
- Wavelength accuracy: ≤±0.5 nm
- Wavelength repeatability: ≤0.2 nm
- Wavelength scan speed: Max. 60,000 nm/min
- Display range: 0 – 260,000
- Sensitivity: 4000:1 (RMS), 1000:1 (Peak to Peak)
- Minimum resolution: 0.5 nm
- Minimum data interval: 0.1 nm
- Interface: USB

- System Key Features must include:
  - High sensitivity for near-IR dyes, chlorophyll, and phthalocyanine analysis
  - Fast scan up to 60,000 nm/min
  - Supports several accessories including a wide range of liquid and solid samples holders
  - Robust long-lived Xenon Arc light source, full spectrum coverage from UV to near-IR
  - Enables precise results with as little as 5 µL sample volume in liquid samples
- Solid samples accessories must be provided with the system:
  - Solid sample holder
  - Variable angle solid sample holder
  - Precision cell for powder samples
  - FL integrating sphere
- Software Key Features must include:
  - Various sample measurement modes such as Fluorescence Measurement, Chemi/Bioluminescence Measurement, Phosphorescence Measurement, Prescan, Spectra Scan, Kinetics, Lifetime Measurement, Quantification, Single Read and Synchronous Scan
  - Allows simultaneous acquisition of both excitation and emission spectra.
  - Controls the instrument's parameters (wavelengths, slit widths, scan speed, etc.) for accurate and precise data collection.
  - Provides tools for processing and analyzing the acquired fluorescence data. Ex: Spectral viewing and manipulation, Peak identification and quantification, Baseline correction, Quantitative analysis.
  - Generate reports of their experimental results
  - Easily switch between a wide range of optional accessories without any downtime with an auto-recognition feature.
  - The instrument connects to the computer via USB, and the software communicates through this interface.

- An appropriate desktop PC and printer must be provided with the system

LOT 5

BET
Only brands from Europe, North America, or Japan are acceptable.
• Semi-automated analyzer designed to perform • Comprehensive catalyst studies by these techniques: • Temperature Programmed Reduction • Temperature Programmed Desorption • Temperature Programmed Oxidation • Pulse Titration • Physisorption for B.E.T. Surface Area and Pore • The resulting data are used to: • Confirm or predict catalyst activity • Determine optimal catalyst preparation conditions for industrial use • Measure efficiency of regeneration of used catalysts • Quickly screen experimental catalysts • Calculate activation energies for a given reaction • Determine relative acid strengths

LOT 6

256-Channel EEG System
Only brands from Europe, North America, or Japan are acceptable.
1. Amplifier (256)
- Channels: 256 EEG (expandable) - Sampling Rate: 1 Hz to 16,384 Hz - Resolution: 24-bit A/D - Input Range: ± 250 mV - Input Impedance: > 1 GΩ - Common Mode Rejection Ratio (CMRR): > 110 dB - Noise Level: < 1 µV RMS - Bandwidth: DC to 5000 Hz - Synchronization: External triggers (TTL), SyncBox optional - Power: USB-powered or battery-powered for mobility - Connectivity: USB 3.0 or fiber-optic connection to PC
2. EEG Cap: waveguard™ original or waveguard™ touch
- Design: 10-5 high-density system layout - Electrodes: Ag/AgCl sintered (gel-based) or dry - Number of Electrodes: 256 - Comfort: Adjustable chin strap, padded design - Impedance: Real-time impedance monitoring (< 50 kΩ recommended) - Sizes: Available from infant to adult - Connector: Custom connector system for fast setup
3. Computer Specifications
- Processor: Intel® Core™ i9 or Xeon® CPU - RAM: 32 – 64 GB DDR4 - Storage: 1 – 2 TB SSD - GPU: NVIDIA Quadro RTX or similar - OS: Windows 10/11 Pro 64-bit - Ports: USB 3.0, HDMI, Ethernet, Optical Audio, etc. - Display: 15–17" Full HD or 4K display (touchscreen optional)
4. Software Suite
- Acquisition Software - Live Data Streaming: Real-time monitoring of 256 channels - Impedance Check: Per-channel graphical interface Event Markers: Manual or automated via TTL triggers Supports dual mode operation for sequencing and fragment analysis on the same plate without hardware changes

LOT 7

Gas Chromatography/Mass Spectrometry (GC/MS)

Only brands from Europe, North America, or Japan are acceptable.

1. General Instrument Features

- User-exchangeable, instant connect plug-in injector and detector modules
- Configuration changes via module swapping, requiring no tools or special training
- Upgradable from one-channel GC to dual-channel GC at any time
- Color HD720p LCD touch screen with:
    - Multi-angle visibility
    - Fast response
    - Workflow-based icon interface
    - Display of all operational parameters including:
        - Temperature, pressure, carrier gas type
        - Flow rates, split flow, detector gas flows
        - Instrument health and consumables counters

2. Injector Specifications

- Accepts up to 2 installed injectors
- Supplied with instant connect Split/Splitless injector:
    - Tool-free installation within minutes
    - Supports all capillary columns (50–530 µm i.d.)
    - Large volume injection (up to 50 µL) without pressure pulse
    - Supports concurrent solvent reconstitution
    - Timed purge line operation
    - Max temperature: 400 °C
    - Split ratio: up to 12500:1
    - Total flow controls:
        - Split flow: 0–1250 mL/min (0.1 mL/min resolution)
        - Purge flow: 0–50 mL/min (0.1 mL/min resolution)
    - Gas saving mode
    - Compatibility with purge & trap, thermal desorption, pyrolysis, headspace
    - Tool-free column connection using vespel-graphite ferrules

3. Detector Specifications

- Simultaneous installation of 4 detectors
- Upgradeable to support 5 detectors: FID, ECD, TCD, NPD, FPD

4. Oven Specifications

- Temperature range: Ambient +3 °C to 450 °C
- Cryo options:
    - –100 °C with liquid nitrogen

- –50 °C with CO_2
- 32 ramps, 33 plateaus
- Max heating rate: 125 °C/min
- Cool-down (450 °C to 50 °C): <4 min
- Ambient rejection: <0.01 °C per 1 °C
- Fast start-up: Ready in 3.5 minutes with one injector and detector at 250 °C
- Internal design with no tubing/wires on oven top
- Clearly labeled injector/detector positions

5. Pneumatics

- Electronic Pneumatic Controls (EPC) embedded in injector/detector modules
- No external plumbing or wires for gas/electrical delivery
- Digital gas controller supports:
  - Constant / programmed flow and pressure
  - Constant linear velocity
  - Surged pressure injection
- Supports up to 18 electronic gas control channels
- Pressure range: 0 – 1050 kPa (0 – 152 psi)
- Pressure resolution: 0.01 kPa or 0.001 psi
- Automatic leak check and column evaluation

➢ Autosampler Specifications

A. General Capabilities

- Supports liquid and headspace injection automation
- XYZ robotic arm with automatic injection tool change
- Compatibility: HS, SPME, SPME Arrow, ITEX-DHS
- Fully unattended operation across multiple techniques
- 2 stations manage up to 6 tools
- System chip reader embedded for all consumables
- Manual teaching functions (tool-free)

B. Compatibility

- Compatible with all injector types: COC, PTV, PKD, PPKD, SSL
- Dual injection support:
- Same GC or 2 independent GC/GC-MS systems
- Dual barcode readers (1D, horizontal)

C. Vortexer and Thermal Options

- Vortex mixing: Up to 2000 rpm
- Heated/cooled vial trays (optional)
- Solvent dilutor: Up to 4 solvents
- Optional centrifuge:
- Configurations: 4×2 mL, 2×10 mL, 2×20 mL
- RCF: Up to 2000 × g @ 4800 rpm

D- Liquid Sampling Specs

- Vial types: 300 µL to 20 mL

- Bottom sensing for low volume samples (≥5 µL)
- Injections: Up to 3 × 1 µL from 5 µL sample
- Volume range: 0.1 µL to 10 mL
- Syringe sizes: 0.5 µL to 10000 µL
- Needle lengths: 57 mm, 85 mm
- Wash station: Up to 4 solvents, 40 mL + 10 mL waste
- Injection volume steps:
    - 0.1 µL up to 100 µL
    - 1 µL between 100 µL – 10 mL

E- Headspace Sampling Specs

- Vial volumes: 2, 10, 20 mL
- Syringe sizes: 1, 2.5, 5 mL (standard or high-temp)
- Needle length: 65 mm
- Sample capacity: Up to 180 vials
- Injection speed: 1–100 mL/min (1 mL/min steps)
- Syringe heating: OFF or 40–150 °C (1 °C steps)
- Oven: 6 vials, 30–200 °C, 250–750 rpm
- Incubation time: 0.1–600.0 min (0.1 min steps)
- Syringe inert gas flush
- Optional:
    - MHE (Multiple Headspace Extraction)
    - Enrichment via cold trap kit

F- Accessories and Services

- Consumables: 2 kits (GC + TSQ MS)
- Database: Complete reference database
- Computer: High-performance factory-tested PC
- Column: Dedicated GC-MS column
- Gas Purification: Gas traps and base filters included
- Power Backup: UPS for GCMS and PC
- Installation and Training:
    - Local, factory-certified engineers
    - Full user training by certified local support team

MS Specifications:

- Mass range should be between 1.2 to 1100 u with unit mass resolution
- System should feature as optional the ability to remove and change/clean the entire ion source without venting the system, and the system should be ready for operation directly after placing the ion source. The feature should be upgraded locally and not at factory site.
- System should feature as optional the ability to change the GC column quickly without the need to vent the system
- Standard ionization mode supplied should be Electron Impact ionization (EI).
- The EI source should be inert, non-coated. Stainless steel EI sources are strictly not acceptable.
- Ion source should include ion volume, repeller, source lenses, RF lens and dual filaments in all ionization modes, programmable to 350 °C
- User should be able to switch from one filament to another in one software button click, no hardware interference is acceptable
- The performance and intensity of the second filament should be equivalent to first one
- System can be also supplied with positive and negative Chemical Ionization (CI) ion source (optional)
- System should have dual-stage turbomolecular pump. Diffusion pumps are strictly not acceptable
- Pumping capacity should be over 300 L/s. Lower capacity is strictly not acceptable.
- MS Modes must include: Full scan (FS), SIM and FS/SIM simultaneous within sample injection, timed acquisition (t-SIM), and FS/t-SIM

- SIM methods should be able to be exported from other sources and to be translated to the GCMSMS system method. Those SIM methods should run immediately on the system or through the automated SRM to translate the SIM information into a powerful SRM method.
- MS/MS modes must include:
  - Multiple/Selected Reaction Monitoring (MRM/SRM), timed acquisition (t-SRM), combined SRM/FS, combined t-SRM/FS, product ion scan, precursor ion scan, neutral loss scan
  - Must feature the ability to convert timed acquisition method (t-SIM/t-SRM) into general mode (segmented) method
- Mass analyzer should include:
  - Heated, off-axis dual curved ion guide for drastic noise reduction
  - Solid homogeneous non-coated, maintenance-free quadrupole rods
- Quadrupole scanning should be up to 20,000 u/s
- Mass resolution must feature:
  - Automatic tuning down to 0.4 u and lower
  - Selectable SRM resolution settings in method at autotune values 0.7, 1.5 u and 2.5 u or custom tune from 0.7 -1.5 u
- Detector must have off-axis 10 kV dynode, discrete dynode multiplier and electrometer
- Linear range must be above 10^7 (from 0 to 110 µA)
- Mass stability should be better than 0.1 u/48hours/$\Delta T \leq 2$ K
- Electron energy should be adjustable from 0 eV up to 150 eV depending on ion source type
- Collision energy should be between 0 eV and 60 eV
- Scanning capabilities:

- System should be able to acquire more than 97 scans/s in FS when scanning over a range of 125 u
- Should feature 0.5 ms minimum SRM dwell times
- Should have up to 800 SRM transitions/s or better

- System should have mechanical rotary vane 3.3 m^3/h oil pump
- Emission current should be up to 350 µA
- Transfer line temperature should reach up to 400 °C
- Instrument detection limit should be below 0.3 fg for 1 ug of OFN
- Standard installation specifications (He as carrier gas)
  - 1µL of 100 fg/µL octafluoronaphthalene (OFN) should produce the following minimum signal-to-noise for the transition from m/z 272 to m/z 222: 30,000:1

- The MS detector should feature the optional ability to accept direct insertion and direct exposure probes for direct solid and liquid sample introduction into the MS without passing by the chromatography column and without requiring a break in the vacuum. Factory upgrades are not acceptable.