॥ सा विद्या या विमुक्तये ॥

भारतीय प्रौद्योगिकी संस्थान धारवाड

Indian Institute of Technology Dharwad

EXPRESSION OF INTREST

No. IITDh/GA/CRF/2018-2019/01

EXPRESSION OF INTEREST (EoI) FOR PROCUREMENT of NUCLEAR MAGNETIC RESONANCE SPECTROMETER

1. **Introduction**

IIT Dharwad is an Institute of National Importance created by an Act of Parliament in 2016. IIT Dharwad has been steadily establishing its operations in its transit campus. Simultaneously, the institute is employing bright young and accomplished faculty. A number of unique research and development programs are on the anvil. The institute now needs to raise the levels of the capacity with the best of the facilities and infrastructure. This will provide highly talented and accomplished faculty to pursue not only their research but also think of innovative way of introducing instructional/teaching/learning solutions to practical problem of the students.

2. **Objective**

The objective of this invitation of Expression of Interest (EoI) is to seek responses from eligible Vendors for SUPPLY, INSTALLATION, COMMISSIONING, DEMONSTRATION and TRAINING OF **Nuclear Magnetic Resonance (NMR) Spectrometer as per Annexure-I**

3. Timelines

3.1 Major activities in the procurement process will be as given below: -

Sl No	Activity	Remarks
(a)	Pre-Bid Meeting	• To clarify the issues/ queries raised by intrested firms facilitate submission of bids.
(b)	Deadline for submission of EoI	• Till 10.00 Hrs on 03/10/2018
(b)	Issue of Tender Document	• Only to the vendors who submit the response to the EoI. Link for downloading the tender document to such vendors will be sent via e-mail on 03/10/2018
(c)	Submission of Tender Documents	• Deadline for bid submission 17/10/2018, 16.30 hrs based on updated specifications and tender document
(d)	Evaluation of Technical Bids	About 3 weeks (Tentative)
(e)	Opening of Commercial Bids	• The shortlisted bidders will be intimated by e-mail the schedule of opening of the commercial bids
(f)	Award of Contract	• The selected vendor will be awarded the contract.

4. MATERIAL DESCRIPTION

Nuclear Magnetic Resonance (NMR) Spectrometer as per as per specifications described below in Annexure-I

4.1 Annexure-I:

- State-of-the-art 400 MHz standard bore Supercon Magnet FT NMR spectrometer with Z-Gradient, double resonance (Two Channels) having capabilities for the most up-to-date hetero nuclear multi-dimensional NMR experiments.
- Warranty for complete solution: 5 Years
- Primary Objective: To handle all application related to Chemistry, the system should be capable of handling other general applications for liquid and solid samples.

4.1.1 Magnet:

9.4 Tesla actively shielded super-conducting magnet with an operational frequency of 400 MHz suitable for solution state and additional solid state accessories NMR work with the following specifications:

- Shortest possible Radial (less than 0.5 m) and Axial distance (less than 1.0 m) of 5 Gauss stray field from the center of the magnet. Please specify the overall Magnet dimensions'/ceiling height requirements
- Low drift rate (less than 4 Hz/hour or better) of the Magnetic field.
- Long Liquid He hold time (365 days or more) and long liquid N_2 hold time (more than 14 days).
- Please specify the total Liq. He and N_2 hold volume, refill interval and refill volume for He and N_2
- All support equipment for cryostat (e.g., He and liq. N_2 transfer lines).
- Digital monitors for He (mandatory) and N_2 levels (optional)
- Anti-vibration legs/stand if required and please specify the lower limit on the frequency of vibrations damped.
- Built-in cryo-shims & room temperature shims;
- Pneumatic/ Automatic sample load / spin / eject system

4.1.2 Console:

Advance designed two channel spectrometer capable of performing all single and multi-dimensional NMR experiments in both labelled and unlabeled samples; fast switching time for all parameters without any hidden delays along with its importance in the quality of the spectra. The console should include capacity for modern pulse shaping, amplitude, phase and composite pulse decoupling creation, preamplifiers with standard filters and digital receiver control with oversampling, either equipped with digital quadrature detection with digitizer's facility for complete elimination of quadrature spikes or a direct digital receiver. It should also be compatible with integration of third or more no. of channels. The console should include:

- Waveform generators for all channels for pulse shaping,
- Amplitude, phase and composite pulse decoupling generator
- Pre-amplifiers and filters for noise reduction
- Z-gradient amplifier: 30 G/cm or better
- High-power linear amplifier for each channel (at least 100 W for ^{1}H and 300 W for hetero nuclear) to provide the shortest possible pulse-widths. Please specify all relevant parameters including power (Wattage), frequency range, duty cycle, maximum pulse duration etc.
- Broad band frequency synthesizers for all channel.
- Transmitter controllers for each channel.
- Digital ^{2}H lock channel consisting of a ^{2}H pre-amplifier. Lock system should have high-precision phase- and field-corrections (please provide documental evidence).
- ADC with high dynamic range and sampling rate. Please specify the resolution of the ADC (in bits) and the maximum sample rate.
- The console should be ready for CP/MAS solid-state NMR experiments, that including necessary amplifiers, RF trans- receiver peripherals, circuitry and filters. All the necessary accessories, and pneumatic accessories-should be quoted separately.
- Two Channel Amplifier System: Two high performance linear amplifier for observation or decoupling of ^{1}H or ^{19}F, with 100W pulse power minimum for ^{1}H and a 300 W pulse power minimum in the range of ^{31}P to ^{15}N. All relevant parameters including power, frequency range, duty cycle, maximum pulse duration etc. have to be explicitly specified.
- Broad temperature range (both low and high) capability is desired (at least -100 deg. C to +150 deg. C): Please specify temperature ranges available for both magic angle spinning and static sample NMR work.
- Please specify resolution/accuracy/stability of temperature setting as well as the high and low limits of attainable temperature.
- Auto shimming feature for both solution and solid state NMR

4.1.2 Probes:

4.1.2.1 Broad band 5 mm dual resonance room temperature probe:

Broad-band 5 mm double resonance probe with ^{2}H locking with Auto-Tuning and matching facility. Following probe specifications to be provided:

- 90^{o} Pulse widths and power for ^{1}H, ^{13}C, ^{15}N, ^{19}F, ^{31}P and other nuclei. Please also specify minimum duration of r.f. irradiation.
- Best resolution and line-shapes. Please specify the line-widths and resolutions achievable.
- Best possible signal–to–noise (S/N) ratio values for ^{1}H, ^{13}C, ^{15}N, ^{19}F, ^{31}P (Please provide data and mention the sample used along with the signal region and noise region).
- Specify highest temperature range achievable (at least -100 deg. C to +150 deg. C).
- Capable of performing ^{1}H with ^{19}F decoupling and vice versa.
- Pulse field gradients with amplifiers capable of generating pulsed gradients of strength of at least 30 G/cm

4.1.2.2 CPMAS probe:

A double resonance 1H/X 3.2 mm Magic Angle Spinning probe for solid state NMR with Zirconia made rotors (3.2 mm) with caps (please quote separately). The probe should possess an X channel that should be broadband tunable from ^{15}N to ^{31}P. The high frequency side of the probe comprises ^{1}H High-Power decoupling. External filters for ^{1}H needed to be specified. It should compatible as per OQ, IQ and PQ compliance. (IQ stands for Installation Qualification. OQ is Operational Qualification and PQ is Performance Qualification for your knowledge).**Fully automated pneumatic unit for high resolution MAS spectroscopy having the followings:**

- Spinning should be controlled through both manual/automation option.
- Accurate spinning rate (up to 15KHz or better) stabilization.
- Status indicator
- Interface for remote control of automated operation.
- Air Cables etc.
- Ten 3.2 mm Zirconium oxide rotors (please mention the effective volume) for solid state NMR analysis
- Sample preparation kit.
- Standard samples for routine calibration

4.1.3 Data storage/software/peripherals:

High speed/memory computers with complete pre-loaded software/data cards for data acquisition, processing and analyses including tools/software for complete automation of data acquisition and peripherals including LCD monitors (21 inch or better), heavy duty B/W printers (quoted in INR preferred). Compatibility for both Windows and Linux is desirable.

- Multi-user licenses for the software (at least fifty numbers).
- All required hardware and software documents, manuals, installation CDs/DVDs etc.
- All standard samples for testing.
- One additional work station with processing software.
- 1 TB external HDD for data back-up
- Test sample kit with all standard samples

4.1.4 Warranty:

- Comprehensive additional warranty for 1+4 years (should quote separately per year), excludes the manufacturer's basic warranty period from the date of installation on all items mentioned above. All parts and labor included with free service and maintenance.
- Regular upgrades to all software during the warranty period
- The manufacturer has to take all the responsibilities (including financial, insurance, etc.) for shipping and installation.
- Since IIT Dharwad is presently operating from its transit campus, in case if the machine needs to be shifted at a later date to permanent campus, the vendor should bear all the cost involved in transportation, insurance, and second installation.
- During the Warranty any downtime caused to the machine beyond two weeks will be liable for imposing a penalty of Rs 15000 on the vendor for each additional week of downtime, separate declaration accepting this condition should be given along with the tender documents

4.1.5 Liquid Helium Contract:

Vendor should enter into contract for supply of liquid helium for 5 Years after the initial refilling and charging. This rate should be quoted in Indian rupees per liter of liquid helium. The firm will be paid as per actual consumption year wise. During contract of liquid helium, if filling is not done as per magnet specifications then vendors should be responsible for any damage to magnet.

4.1.5.1 Supply of cryogen for installation and above:

The liquid helium and liquid nitrogen required for installation should be provided by the vendor at their expense. In case of magnet-quench during the installation or at subsequent times due to any technical reason or failure, the supply (including transport) of the liquid Helium, till the magnet is

restored to normalcy, is the vendor's responsibility and the entire costs for cryogenics, recharging or replacing the magnet, should be borne by the vendor at no additional cost to IIT Dharwad.

4.1.6 Indigenous Items:

Please quote separately with specifications suitable for the NMR spectrometer:

- An ISO-9001 certified or equivalent 'oil-free' scroll type compressor (minimum 3HP) along with two dryers (refrigerated and heatless) and stainless steel storage tank (80 liters or above). The compressor should have low noise (preferably less than 50dB). Installation should be included as per site requirement.
- ISO-9001 certified or equivalent UPS systems with suitable capacity-minimum backup of 2 hour or more (quoted in INR preferred) with compatible voltage stabilizer. Installation should be included as per site requirement.
- Stainless steel, self-pressurized, transportable liquid nitrogen Dewar of capacity 100-150 L (2 no.) with accessories, wheels and safety devices

4.1.7 Onsite Training:

On site complete training of maintenance and operation of the complete system, and platform, to relevant staff members for two weeks initially and additional two weeks after 6 months/one year.

4.1.8 Additional points:

- Additional CP/MAS sample rotor kit
- Complementary site planning should be offered by the vendor
- Vendors should quote price for each component separately
- 5 mm high quality NMR tubes – 500 Nos.
- Spinner turbines – 100 Nos.
- High quality solid state NMR tubes – 50 Nos.
- Spinners for high and low temperature applications-10 Nos.
- Vendors should quote on Free on Road Basis (F.O.R. IIT Dharwad basis) Price. (Transit Campus address), it includes delivery charges and customs clearance etc.
- Auto sampler with a capacity of 60 samples

Optional:

- Skilled Manpower for smooth operation and maintenance of the instrument for 6 days in a week basis for 3 years (quote separately) & AMC for 5 years after the expiry of standard 5 years' warranty. This must be quoted year wise

DETAILS OF PRE-BID MEETING

To clarify the issues/queries raised by intrested firms and to facilitate in submission of bids, the pre-bid meeting would be held as follows:

Place	Time	Date
Board Room, Admin Building, IIT Dharwad	16.00 Hrs	03/10/2018

PROCEDURE FOR SUBMISSION OF RESPONSE TO THE EoI

The response to the EoI should reach IIT Dharwad on or before 03/10/2018 by 10.00 hrs on the following address:

The Officer on Special Duty
(Admin, Finance & Contracts)
P.B. Road, Near High Court, Dharwad-580011

Or can be forwarded by e-mail at pro@iitdh.ac.in on or before 03/10/2018 by 10.00 hrs.

For any queries, you may reach us at 0836-2212839

Please acknowledge the receipt of this invitation for EoI

Sd/-
Officer on Special Duty
(Admin, Finance & Contracts)
IIT Dharwad