INSTITUTE OF NANO SCIENCE AND TECHNOLOGY, MOHALI

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Ref No. INST/12(66)/2019-Pur   Date:13/12/2019

CORRIGENDUM

Reference to NIT no. INST/12(66)/2019-Pur published in national newspapers for purchase of equipment: Integrated Spectro-Electrochemistry System with Accessories. Below mentioned technical points may be read and corrected as per following:-

Present Tender Specifications	Modified Specifications after pre-bid meeting
INTEGRATED/SYNCHRONIZED RAMAN BASED SPECTROELECTROCHEMISTRY SYSTEM An integrated Raman based spectro-electrochemistry workstation is required with possibility to conduct electrochemistry based in-situ Surface Enhanced Raman Spectroscopy (SERS) studies with or without screen printed electrodes. The set-up should also individually allow electrochemistry analysis, Raman analysis and fully synchronized real-time Raman Spectro-electrochemistry. A complete solution must be provided with Raman SEC cell is should be supplied from single vendor also having: • Standard quality certification (ISO 9001) • Single Vendor for a complete workstation with at least 5 Years warranty **TECHNICAL SPECIFICATIONS: An integrated/synchronized set-up is required containing both the following parts and equivalent or better specifications as mentioned below** **PART A: ELECTROCHEMICAL WORKSTATION** • Operating modes: BiPotentiostat, Potentiostat, Galvanostat • DC-Potential range: ±4 V	**INTEGRATED/SYNCHRONIZED RAMAN BASED SPECTROELECTROCHEMISTRY SYSTEM** An integrated Raman based spectro-electrochemistry workstation is required with possibility to conduct electrochemistry based in-situ Surface Enhanced Raman Spectroscopy (SERS) studies with or without screen printed electrodes. The set-up should also individually allow electrochemistry analysis, Raman analysis and fully synchronized real-time Raman Spectro-electrochemistry. A complete solution must be provided with Raman SEC cell is should be supplied from single vendor also having: • Standard quality certification (ISO 9001) • Single Vendor for a complete workstation with at least 5 Years warranty **TECHNICAL SPECIFICATIONS: An integrated/synchronized set-up is required containing both the following parts and equivalent or better specifications as mentioned below** **PART A: ELECTROCHEMICAL WORKSTATION** • Operating modes: BiPotentiostat, Potentiostat, Galvanostat • DC-Potential range: ±4 V

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- Current ranges (potentiostat): ±1 nA to ±10 mA (8 ranges)
- Maximum measurable current: ±40 mA
- Potential ranges (galvanostat): ±100 mV, ±1 V
- Applied Potential Resolution: 1 mV
- Measured Current Resolution: 0.025 % of current range (1 pA on lowest current range)
- Applied Current Resolution: 0.1 % of current output range
- Measured Potential Resolution: 0.012 % of potential range
- Potential Accuracy: ±0.2 %
- Current Accuracy: ≤0.5 % of current range at 100 nA to 10 Ma

PART B: IN-SITU SURFACE ENHANCED RAMAN SPECTROSCOPY

LIGHTSOURCE

- Wavelength: 532 ± 1 nm (It should have provision for other wavelength laser)
- Spectral line width: < 0.2 nm FWHM
- Stability: ± 0.1 nm (-20 to 55ºC)
- Optical power output: 100 mW
- Output power stability: ± 1%
- Warm-up time: 10 s from cold start; 1.5 s from warm start
- Fiber optic connector: FC (number 3)
- Grating: 600 lines/mm and/or 1800 lines/mm

SPECTROMETER

- Detector: 2D CCD Array, Back thinned TE Cooled ; Pixels: 1044 x 64
- Wavelength range: 532 – 1010 nm
- Raman shift: 0 – 3500 cm-1
- Resolution: < 4 cm-1 (0.3 nm)
- Signal-to-noise ratio: 1000 : 1 (at full signal); Dynamic range: 85000 : 1
- Integration time: 8 ms to 60 min
- A/D resolution: 18 bit; Fiber optic connector: SMA 905

Accessory (A): Raman Probe + RAMAN EC Cell Set-up + electrochemical cell:

- Current ranges (potentiostat): ±1 nA to ±10 mA (8 ranges)
- Maximum measurable current: ±40 mA
- Potential ranges (galvanostat): ±100 mV, ±1 V
- Applied Potential Resolution: 1 mV
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- Applied Current Resolution: 0.1 % of current output range
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- Potential Accuracy: ±0.2 %
- Current Accuracy: ≤0.5 % of current range at 100 nA to 10 Ma

PART B: IN-SITU SURFACE ENHANCED RAMAN SPECTROSCOPY

LIGHTSOURCE

- Wavelength: 532 ± 1 nm
- Spectral line width: < 0.05 nm FWHM
- Stability: ± 0.05 nm (10 to 35ºC)
- Optical power output: 100 mW
- Output power stability: ± 1%
- Warm-up time: 10 s OR LESS from cold start; 1.5 s OR LESS from warm start
- Fiber optic connector: FC (number 3)
- Grating: 600 lines/mm and/or 1800 lines/mm

SPECTROMETER

- Detector: 2D CCD Array, Back thinned TE Cooled ; Pixels: 1044 x 64
- Wavelength range: 532 – 887 nm
- Raman shift: 150 – 7523 cm-1
- Resolution: < 4 cm-1 (0.3 nm)
- Signal-to-noise ratio: 1000 : 1 (at full signal); Dynamic range: 85000 : 1
- Integration time: 8 ms to 60 min
- A/D resolution: 18 bit; Fiber optic connector: SMA 905

Accessory (A): Raman Probe + RAMAN EC Cell Set-up + electrochemical cell:

A Reflection probe designed to be used with a single excitation 532 nm wavelength

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A Reflection probe designed to be used with a single excitation 532 nm wavelength (up to 500 mW) must be provided that would be suitable to work with a dedicated Raman Cell for Screen-Printed Electrodes or with any conventional RAMAN Set-up. Electrochemical cell and electrodes (working reference and counter) for conventional electrochemistry and Raman measurements., **Raman cell for Flow based configuration with working electrode as FTO slide, Ag/AgCl aqueous and non-auqeous reference and platinum counter electrode**

Accessory (B): Screen Printed Electrodes + Cable: Thick film copper SPEs (Aux.: C; Ref.: Ag) (Qty. 20), Screen-printed silver SPE (Aux.: C; Ref.: Ag) (**Qty. 25**); Screen-printed gold SPE (Aux.: C; Ref.: Ag) (**Qty. 100**); Screen-printed Carbon SPE (Aux.: C; Ref.: Ag) (**Qty. 100**); **Glassy (Vitreous) Carbon substrates (Qty. 20); ITO (Qty. 20)**

Conventional measurements: Instrument should have option to provide individual electrochemistry and Raman (SERS) measurements option.

Computer Station:

A suitable branded All-in-one desktop Computer for system control & data acquisition should be offered with the system. It should have following minimum specs: CPU Intel Core i7, RAM 8 GB RAM, HDD 1 TB, GPU DirectX 9.0c compliant display adapter with 1GB RAM, DVD writer: one; Operating system: Windows 10 + MS office home & student 2016; WLAN; Wi-Fi and Bluetooth combo; Wireless mouse and keyboard

(up to 500 mW) must be provided that would be suitable to work with a dedicated Raman Cell for Screen-Printed Electrodes or with any conventional RAMAN Set-up. Electrochemical cell and electrodes (working reference and counter) for conventional electrochemistry and Raman measurements., **Raman cell for Flow based configuration with working electrode as FTO slide, Ag/AgCl aqueous and non-auqeous reference and platinum counter electrode**

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UPS: Compatible Online UPS with One Hour back up

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Software: Software should be capable of supporting a wide variety of electrochemical techniques for advanced sensor research (**20+ modern electroanalytical techniques**).

- Time resolved RAMAN, **manual power attenutor**, Real Time panel that collects the generated spectra not only during the electrochemical measurement but continuously at any time, Spectroscopic measurements in Counts, Counts minus Dark, Raman, Raman Shift during the Electrochemical process.
- Plot of Optical Signals vs. Potential/time Curves at specified wavelength and Raman Shift.
- Plot overlay, peak integration, smoothing, subtraction, derivative curve, baseline fitting.

  3D plotting of curves, spectrum film recording video generation.

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