

Ref.: IICB/PUR/2022-23/599/495/T and PC/375, Dt.02.12.22

This specification was finalized as per the pre-Bid meeting with suppliers on 01.02.23, at the IICB Jadavpur campus.

Differential Scanning Micro-calorimeter system (DSC) Specifications

General features required: The quoted system should directly measurement of bio-molecular stability in solution. Users should enable to study molecules in their native state, which could be used with solutions that interfere with optical methods including turbid or colored solutions or particulate suspensions. It should provide insights into mechanisms of unfolding and refolding of molecules in the native or binding state.

The Capillary DSC System should be a highly sensitive differential scanning calorimeter for characterizing the thermal stability of macromolecules in a solution state.

It should be able to find out the thermal response of macromolecules, and small molecules in a solution state very precisely, in terms of micro-calorie range with precise repeatability. The system must be capable to scan both forward and reverse scans in a single operation of any sample study.

It should directly measure the enthalpy (ΔH), heat capacity change (ΔCP), and temperature ($T_{1/2}$, T_m onset & T_m) of thermally induced structural transitions in solution.

The system should be a highly sensitive differential scanning calorimeter with cells enclosed in an adiabatic chamber **with an inbuilt Peltier** system and power feedback loop for heat compensation and to sense heat difference as low as possible in the range of $\mu\text{Cal}/^\circ\text{C}$.

Unfolding and Refolding Mechanism: It should provide insights into the mechanism of Protein/DNA/RNA/Lipids or other macromolecules, polymers, etc., unfolding and refolding process.

Cell type & volume: Equal and fixed cells both reference & sample cells, the system should have an active cell volume as low as possible with operation total volume preferably $\leq 300 \mu\text{L}$.

Cell Material: It should be made of Tantalum, Platinum, or gold in high purity.

Cell Configuration: It should be capillary cells with attached Peltier units so as to provide faster equilibration, faster response time, better accuracy, and better sensitivity.

Noise & Scan Rate: The short-term noise must be preferably less than $0.10 \mu\text{Cal}/^\circ\text{C}/\text{minute}$ with a scan rate in the range of $0-4^\circ\text{C}/\text{minute}$ for a 2°C to 130°C scan temperature range. The scan must be both forward and reverse mode which must be programmable sequentially scanning in a single operation of sample.

The repeatability of measurement and system reproducibility all should be certified in a standard quality certificate of a recognized agency. Baseline repeatability should be less than equal to $1 \mu\text{Cal}/^\circ\text{C}/\text{minute}$ certified of standard.

Typical sample concentration: 0.01-10 mg/mL or less preferred with proven journal of publication(s) worked using the quoted model in biological applications or chemistry in such lowest concentration of the sample.

The application features should be validated with the reputed international journals which used the particular quoted model to do the work.

Automated Cell Cleaning: Cell cleaning should be fully automated for walk-away operation and to avoid as much human handling error as possible with controlled temperature and preferably controlled pressure. The system may or may not have a sample degassing unit.

System Software: The Capillary DSC system should be controlled by an intelligent user interface, system operations, and data analysis software, and a minimum of 5 users selectable curve fitting models should be provided along with the main system. The data analysis software should have a provision of at least 5 user selectable curve fitting models like Two-State, Non-Two-State, and Two-State with ΔC_p , Dissociation with ΔC_p Sequential, T_m - Shift, and Protein-Protein; as per the standard literature of unfolding/ refolding of macromolecules.

Suitable and adequate software for operation and data processing with license and all applications.

In addition: The system should be quoted with the particular standard model and there should be user feedback and satisfactory report. It should come with **three years of comprehensive warranty** with application and service experts available locally or immediately on a requirement basis.

UPS system of minimum 30 minutes back up of power on full load with precise output voltage.

The required computer of standard configuration which is suitable for the system operation also should be provided with the system.

Spares: 1. O-ring, Buna 2. Assembly, Cell Port Cap of DSC 3. Kit, Fuse, Power Entry Module

4. Cleaning Device of DSC 5. FAN, 12VDC, 40X20MM 6. O-RING, VITON, 017 (minimum Pk of 10) 7. ul range Pipette Tips of DSC all should be sufficient quantity.