

# SOPHISTICATED ANALYTICAL INSTRUMENT FACILITY (SAIF) KARNATAK UNIVERSITY, DHARWAD

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Sophisticated Analytical Instrument Facility (SAIF), was established at the Karnatak University, Dharwad in the year 2014 with the financial support from the Department of Science and Technology (DST), Government of India, with the following objectives.

- To provide services of facilities of sophisticated analytical instruments to scientists and academicians from academic institutes, R&D laboratories and industries to enable them to carry out measurements for R&D work.
- To acquire and develop capability for preventive maintenance and repair of sophisticated instruments.
- To organize short term courses/workshops on the use and application of various instruments and analytical techniques.

SAIF centre at the Karnatak University, Dharwad, houses a variety of major analytical instruments which are operated and maintained by a dedicated and qualified group of Scientists and Engineers. It is an integral part of Karnatak University, Dharwad.



## **FACILITIES AT SAIF, KARNATAK UNIVERSITY, DHARWAD**

1. 400 MHz FT-NMR Spectrometer
2. SEM with EDS & essential sample preparation accessories
3. X-Ray Diffractometer (Powder) with accessories

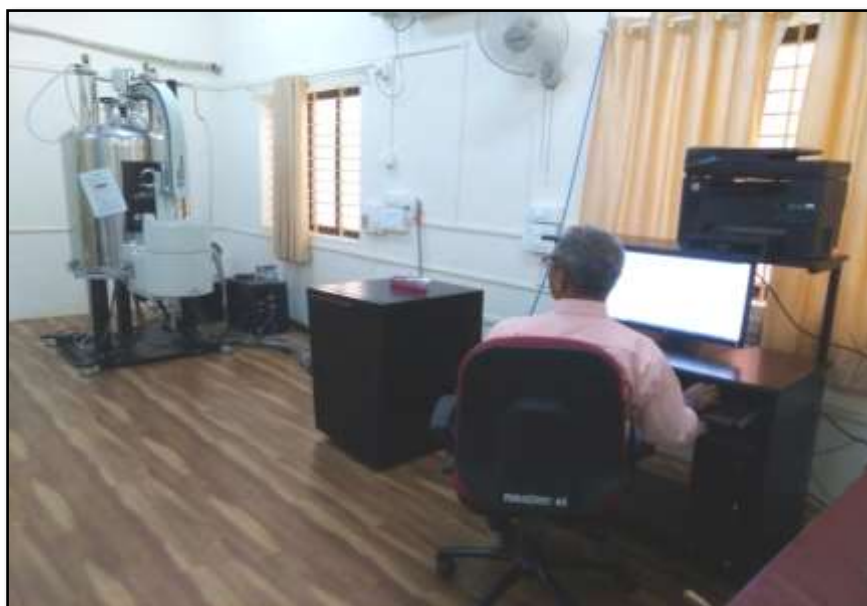
The facilities provided by the SAIF may be utilized by any user/organization on payment of nominal charges. The details about the procedure for using the facilities and the charges for sample analysis can be obtained from the SAIF centre, Karnatak University, Dharwad.

The facility is equipped with the instruments to carry out spectral measurements, structure determination and chemical analysis. The facility actively caters to the research needs of the scientists / researchers throughout India. SAIF has been serving the research community in a significant way. We invite Institutions, R&D labs and industries to make use of the facilities and the technical know-how present in SAIF.

The day-to-day functioning of the SAIF is overseen by the Head, SAIF, who is a faculty member of the Institute. The Facilities Management Committee (FMC) oversees and guides the activities of the SAIF.

# 1. 400 MHz FT-NMR SPECTROMETER

(Model: JNM- ECZ 400S)



## **SUPER CONDUCTING MAGNET SPECIFICATIONS :**

Magnet type: compensated self shielded solenoid. Central field: 9.39 T (400MHz).

**LIQUID HELIUM CRYOGEN DETAILS :** Tank capacity: 139L. Temperature: 4.2K

**LIQUID NITROGEN CRYOGEN DETAILS :** Tank capacity: 67L. Temperature: 77K

## **SUPER CONDUCTING SHIM COILS SPECIFICATIONS :**

Shim provided: Z0, Z1, Z2, Z3, X, Y, ZX, ZY, XY (S2), X2-Y2 (C2).

**AUTO TUNE PROBE :** With auto tuning unit, automatically tuning is done for multiple nuclei.

**OBSERVATIONS NUCLEI:**  $^1\text{H}$ ,  $^{13}\text{C}$ ,  $^{19}\text{F}$ ,  $^{31}\text{P}$  TO  $^{15}\text{N}$ ,  $^{39}\text{K}$ ,  $^{109}\text{Ag}$ .

**AUTO SAMPLE CHANGER :** With auto sampler unit 30 samples can be loaded. The auto sample changer automatically transfers one sample from prearranged position on a turntable on to SCM. It also retrieves the sample from the SCM and returns it to original position on the turntable.

## 2. SEM with EDS & ESSENTIAL SAMPLE PREPARATION

**ACCESSORIES** (Model : JSM-IT500 InTouchScope™ Scanning Electron Microscope)



### MAIN OPTIONS:

- Backscattered Electron Detector (BED)
- Low Vacuum Secondary Electron Detector (LSED)
- Energy Dispersive X-ray Spectrometer (EDS)
- Electron Backscatter Diffraction Detector (EBSD)
- Load Lock Chamber (pre-exchange chamber)
- Stage Navigation System (SNS)
- Chamber Scope (CS)
- 3D Measurement Software

### RESOLUTION:

**High vacuum mode:** 3.0 nm (30 kV) 15.0 nm (1.0 kV)

**Low vacuum mode:** 4.0 nm (30 kV BED)

**Direct magnification:** x5 to x300,000, Defined with a display size of 128 mm x 96mm)

**Displayed magnification:** ×14 to ×839,724 (on the monitor) (Defined with a display size of 358 mm x 269 mm)

**Electron gun :** W filament, Fully automatic gun alignment

**Accelerating voltage:** 0.3 kV to 30kV

**Probe current :** 1 pA to 1 μA

**Low-vacuum pressure adjustment :** 10 to 650Pa

**Objective lens aperture :** 3-stage, with XY fine adjustment function

**Automatic functions :** Filament adjustment, Gun alignment, Focus / Stigmator / Brightness / Contrast

**Maximum specimen size :** 200 mm dia. x 75 mm height, 200 mm dia. x 80 mm height, 32 mm dia. x 90 mm height

**Specimen stage :** Large eucentric type, X: 125 mm, Y: 100 mm, Z: 80 mm, Tilt: — 10° to 90°, Rotation: 360°

**Montage function:** Built-in

**Measurement position coordinate display :** 203 mm dia.

**Standard recipes :** Built-in (includes EDS functions )

**Image mode :** Secondary electron image, REF image, Composition image, Topographic image, Stereo-microscopic image, etc.

**Pixels for image acquisition :** 640 x 480 1,280 x 960 2,560 x 1920 5,120 x 3,840

**EDS functions :** Spectral analysis, Qualitative & Quantitative analysis, Line analysis (horizontal line, specific direction line), Elemental mapping, Probe tracking etc.

**Measurement functions :** Built-in (distance between 2 points, distance between parallel lines, angle, diameter, etc.)

**Vacuum system :** Fully automatic, TMP: 1, RP: 1 or 2

### **3. -Ray DIFFRACTOMETER (POWDER) WITH ACCESSORIES** (Model : SmartLab SE, Rigaku Corporation)



#### **SPECIFICATIONS :**

- \* Fully automated alignment under computer control.
- \* Optional in-plane diffraction arm for in-plane measurements without reconfiguration.
- \* Focusing and parallel beam geometries without reconfiguration.
- \* SAXS capabilities.
- \* Optional D/teXUltra high-speed, position-sensitive detector system.
- \*  $2\theta$ :  $2^\circ$  to  $150^\circ$
- \* Input : AC220V-230V IPhase 50/60Hz 40A

**Instrument facilities available at  
SOPHISTICATED ANALYTICAL INSTRUMENT FACILITY (SAIF),  
KARNATAK UNIVERSITY, DHARWAD.**

<i>Sl. No.</i>	<i>Instrument</i>	<i>Make/ Model</i>	<i>Major Specifications/ Accessories available</i>	<i>Type of measurement/ Analysis available</i>
<b>1</b>	<b>FT-NMR Spectrometer</b>	<b>Jeol 400 MHz / JNM- ECZ 400S</b>	<b>Operating Frequency: 400 MHz Probe, -80<sup>o</sup> C to 150<sup>o</sup> C temperature Auto sample changer with handling capacity of 30 samples</b>	<b>Structure identification of organic, inorganic and polymer materials 1D and 2D NMR spectra of all active nuclei, DEPT, APT, Cosy, Cosy with or without gradient, TOCSY, NOESY, HMQC, HMBC</b>
<b>2</b>	<b>X-ray DIFFRACTOMETER (Powder)</b>	<b>Rigaku Smartlab SE</b>	<b>Fully automated computerized powder XRD; X-ray tube: Cu Angular range (2<math>\theta</math>) : 2<sup>o</sup> to 150<sup>o</sup></b>	<b>2<math>\theta</math> vs intensity plots / Xray diffractograms; Quantitative analysis and other studies including phase identification, unit cell parameter determination, Particle size determination etc. The results are given in the form of intensity verses 2-theta position with printed peak position, d-values, FWHM and relative intensity</b>
<b>3</b>	<b>Scanning Electron Microscope with EDS</b>	<b>Jeol JSM / JSM- IT500LA</b>	<b>Magnification up to 3,00,000 X Resolution : 3nm Acc. Voltage up to 30kV Max. specimen size: 200mm Dia X 75mm height Fully computer controlled Carbon, Gold coating</b>	<b>Surface topographic / morphological studies of microstructures on bulk specimens of biological or other materials ; SEI, BEI images; image analysis</b>