

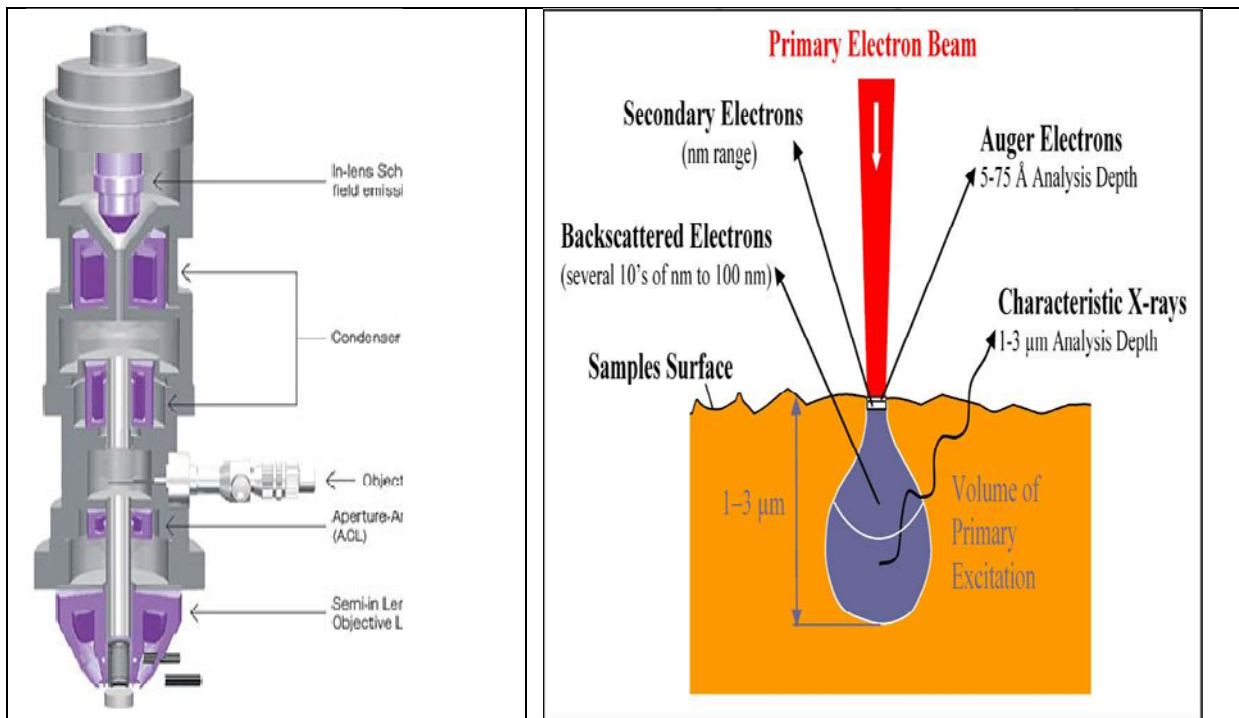
Name	<b>Field Emission Electron Scanning Microscopy (FESEM)</b>
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Make: JEOL India Pvt Ltd.	Model : JEOL JSM 7610f
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**Specification**

**Electron gun** : Schottky type field emission (T-FE) gun  
**Electron Beam resolution** (secondary electron image)  
1.0 nm at accelerating voltage 15 kV  
1.5 nm at accelerating voltage 1kV in GB mode  
2.5 nm at accelerating voltage 1kV in SEM mode  
**Magnification**  
LM (low magnification) mode : x25 to x19000  
High magnification mode : x130 to x1000000  
**Specimen stage** : Fully eucentric goniometer stage  
**Image modes** :Secondary electron image (SEI)  
**Accelerating voltage**  
SEM mode : 0.5 to 30 kV  
GB mode : 0.1 to 3.9 kV  
Probe-current : Order of  $10^{-13}$  to  $2 \times 10^{-7}$   
**Detectors Available:**  
**EDS detector** : EDAX make LN2 free, peltier cooled, Octane plus model, (30mm<sup>2</sup> and 127 eV resolution) with T EAM software support for live spectral, lines scan and mapping data collection facilities.  
**Cathodoluminescence Image (CL)** : Deben make  
**EBSD detector** : EDAX make Pegasus Model  
IR camera for viewing sample in the chamber



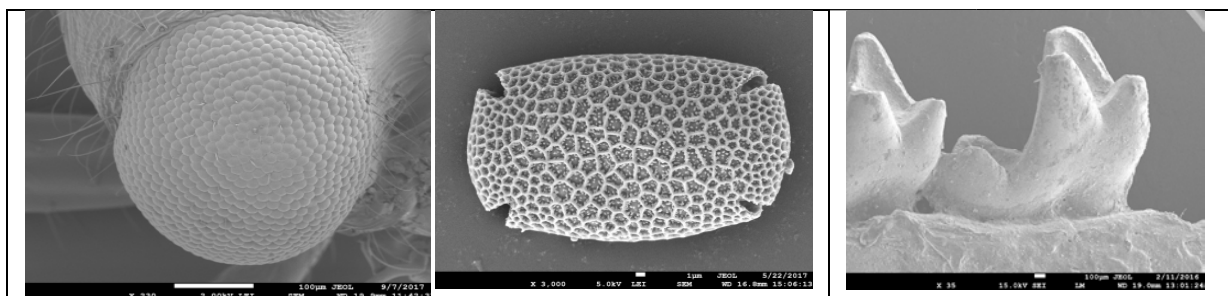
**Working principle:**

Scanning electron microscopy (SEM) is one of the most versatile and well known analytical techniques for observing the surface of specimen. Compared to conventional optical microscope, an electron microscope offers advantages including high magnification, large depth of focus, great resolution and ease of sample preparation and observation. Electrons generated from an electron gun enter on the surface of a sample and inelastic interaction with atoms in the specimen produces variety of signals that contains the information about the surface morphology and composition. The specimen generates many low energy secondary electrons. The intensity of these secondary electrons is governed by the surface topography of the sample. An image of the sample surface is therefore constructed by measuring secondary electron intensity as a function of the position of the scanning primary electron beam.

The JSM 7610F, FESEM consists the Schottky field Emission gun that makes use of electric field emission to lower the work function and enhanced the thermionic emission of tungsten. The field emission gun produced an electron beam that is smaller in diameter, more coherent and greater current density or brightness. JSM 7610F equipped with Gentle Beam (GB) mode provides high resolution images even at low accelerating voltage from 100V to 3.9 kV without damaging the specimen surface.

**Application**

The researchers from various disciplines study their variety of samples for structural and morphological analysis. The samples should be dry (dehydrated) and volatile free and may be Powder, Thin film, Powder pallet, Biological, Geological, Fossils, Nanomaterials, Polymers, Ceramics, Metals, Dental materials, Pharmaceuticals for details investigation of morphological features



**Sample preparation facility**



**Au/Pd Sputter Coater**

**Carbon Coater**

**Critical Point Drying (CPD)**

**User Instruction**

The size of sample should be less than 12.0 mm x 12.0 mm x 10 mm (height) and side opposite the side of interest, should be flat (to enable sample mounting). The small sample height is better.

The samples should be dry and should withstand high vacuum ( $10^{-5}$  pa).

The surface of the samples should be clean and contamination free for the better results.

Wet biological samples cannot be done in FESEM. Biological samples will be accepted only after primary fixation and dehydration.

User is welcome to be present in FESEM unit during analysis.

**Contact Person**

<b>In-Charge</b>	Dr.subodh kumar (0522-2742921); subodh_kumar@bsip.res.in
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<b>Staff:</b>	
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**charges**

S.No	Facilities	University	National Lab/R&D's	R & D Industry	Remark
1	Specimen (Au/Pd/C) coating	Rs. 100/-	Rs. 150/-	Rs. 500/-	per stub
2	CPD	Rs. 200/-	Rs. 300/-	Rs. 500/-	per sample
3	FESEM- Imaging	Rs. 500/-	Rs. 700/-	Rs. 1000/-	per sample
4	EDS	Rs. 300/-	Rs. 500/-	Rs. 1000/-	per spectrum
5	EDS + FESEM – Images Analysis	Rs. 700/-	Rs. 1000/-	Rs. 3500/-	per sample
6	Mapping	Rs. 1000/-	Rs. 2000/-	Rs. 5000/-	per map

### **Guideline**

1. The analytical data/spectra provided cannot be used as certificates in legal disputes.
2. Service charges (including GST) will be payable in advance (Draft/RTGS/NEFT) in favour of “The Director, BSIP, Lucknow”. Payable at Lucknow
3. Separate samples should be sent for different analysis. Samples will not be analysed until payment is received.
4. In case of prepared samples, the user must specify the procedure that how the sample was prepared (complete methodology).
5. In all correspondence related to analysis, our reference number must be mentioned.
6. Individual Scientists and Research fellows should send their application and samples through their project head. Discount in analysis charges for research fellows of universities/institutes will be decided by the Director in consultation with respective lab.
7. Interpretation of data/spectra will NOT be done.
8. It is mandatory for user to acknowledge the facility in their research work and communicate the same to the respective laboratory and the Director, BSIP, Lucknow for onward communication to DST, New Delhi. .

To be filled in by the user while submitting the form

Job No as SEM

Date of submission:

(Sample Information Form)

REQUISITION FORM

**BIRBAL SAHNI INSTITUTE OF PALAEOSCIECES, LUCKNOW**

53, University Road, Lucknow, Ph. 0522-2740008, 2740399

(Scanning electron microscopy Facility)

Website: [www.bsip.res.in](http://www.bsip.res.in),

**(Information to be filled in by the user)**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Email and Mobile No.: \_\_\_\_\_

Category (In-house/sponsored/Govt. organization/private): \_\_\_\_\_

Number of samples: \_\_\_\_\_

Sl. No.	Sample ID	Type/Nature of Sample	Quantity	Year of collection	Lat./Long.	Remarks, if any
1						
2						
3						
4						
5						

To be filled in by the user while submitting the form

Job No as SEM

Date of submission:

SAMPLE REQUISITION FORM

**BIRBAL SAHNI INSTITUTE OF PALAEOSCIECES, LUCKNOW**

53, University Road, Lucknow, Ph. 0522-2740008, 2740399

(FESEM facility )

Website: [www.bsip.res.in](http://www.bsip.res.in),

**(Information to be filled in by the user)**

**User Information:**

1. User Type : Unpaid research scholar / Paid research scholar / Industry
2. Name :
3. Designation :
4. Research Area :
5. Affiliation :
  
6. Address of communication :
  
7. Phone number :
8. Email address :

**Sample Information:**

1. Sample (Type of Material) :
  2. Sample Size :
  3. Number of samples :
- Type of analysis required:** (mark which is required)
1. Coating (Au /Pd / C)
  2. CPD
  3. FESEM Image analysis
  4. EDS (specify expected list of elements)
  5. FESEM Imaging with EDS
  6. Mapping

**Recommendation from Head of the Department**

Signature of user

Supervisor's Signature

Signature of Head of  
Department with official  
Seal

**(For office use only)**

Lab Reference No.:

R.P.C.C./ Registrar : Kindly raise the bill for the above

Total Charges:

Taxes:

Grand Total: