



REPORT ON VISIT TO
SATHI CENTRE FOR IN-SITU & CORRELATIVE MICROSCOPY
(SATHI-CISCoM), IIT HYDERABAD

Date of Visit: 19th September 2026

Place of Visit: SATHI Centre for In-Situ & Correlative Microscopy (SATHI-CISCoM),
Indian Institute of Technology Hyderabad, Sangareddy, Telangana

Faculty Members Visited:

1. **Dr. Koppala R. V. S. Chaitanya**, Associate Professor, Department of Pharmacology
2. **Dr. M. Sreekanth**, Associate Professor, Department of Pharmacology

1. Introduction

As part of exploring advanced research facilities and opportunities for collaborative research, I, along with Dr. M. Sreekanth, visited the SATHI Centre for In-Situ & Correlative Microscopy (SATHI-CISCoM), IIT Hyderabad, on 19 September 2026. The visit was undertaken following an invitation extended to our college to understand the advanced characterization facilities available at the centre and to explore their possible utilization for academic, pharmaceutical and collaborative R&D activities.

SATHI-CISCoM is established at IIT Hyderabad under the Sophisticated Analytical and Technical Help Institutes (SATHI) Scheme of the Department of Science and Technology (DST). IIT Hyderabad is the host institution, with Sri Vishnu Educational Society (SVES) listed as a partner institution. The centre was established with the objective of providing advanced characterization capabilities across multiple length scales for fundamental and industrial R&D.

The centre describes its core objective as “To Enable Real-Time Characterization across Multiple Length Scales.” It brings together advanced microscopy, spectroscopy, imaging and sample-preparation capabilities relevant to diverse disciplines, including biology and pharmaceutical sciences.

2. Objectives of the Visit

The major objectives of our visit were:

- To understand the infrastructure and advanced analytical facilities available at SATHI-CISCoM.



- To study the applications of sophisticated microscopy and characterization techniques in pharmaceutical and biomedical research.
- To understand the sample preparation requirements for different analytical techniques.
- To explore possibilities for characterization of pharmaceutical formulations, drug substances, nanoparticles, biomaterials and biological samples.
- To identify potential areas for collaborative research projects and student research activities.
- To understand the possibility of utilizing the facility for faculty research, consultancy and externally funded research projects.
- To explore opportunities for collaboration with IIT Hyderabad and other institutions associated with the SATHI cluster.

3. Overview of SATHI-CISCoM

SATHI-CISCoM at IIT Hyderabad has been established through a consortium of partner institutions with support from the DST under the SATHI programme. The centre is designed as an advanced research and characterization facility serving academic institutions, R&D laboratories and industries.

The SATHI-CISCoM facility is supported by a consortium of 18 partner institutions comprising premier academic, research and industrial organizations. IIT Hyderabad serves as the Host Institution, with partners including the University of Hyderabad, VNIT Nagpur, NIT Raipur, NIT Warangal, NIT Andhra Pradesh, Telangana Council for Higher Education, CBIT, Sri Vishnu Educational Society, Veltech University, ARCI, CCMB, IICT, LVPEI, Dr. Reddy's Laboratories, Bharat Biotech, Amara Raja Group and TATA Steel. This multidisciplinary consortium provides a strong platform for academic–research–industry collaboration and facilitates access to advanced characterization facilities for researchers, faculty and students.

The facility is particularly significant because it integrates different characterization approaches so that materials and samples can be studied at multiple length scales. The centre brings together expertise from metallurgy, materials science, physical sciences, chemistry, biology and pharmaceutical studies.

The SATHI-CISCoM brochure also specifically indicates that the facility welcomes users from academic institutions, R&D laboratories and industries.

4. Major Facilities Observed/Discussed During the Visit

During the visit, we were introduced to various sophisticated analytical and microscopy facilities. The major facilities relevant to our academic and pharmaceutical research interests are summarized below.



4.1 Focused Ion Beam (FIB) – JIB-4700F

The JIB-4700F Focused Ion Beam system combines high-resolution electron imaging with focused ion beam capability. The system provides resolution up to 1.6 nm at 1 kV, with an in-lens Schottky-emission electron gun and high probe current capability. The FIB can also be used for ion milling and specimen preparation for advanced techniques such as APT and TEM.

The facility discussions helped us understand the importance of FIB-based sample preparation, particularly when very small or site-specific regions of a sample need to be examined.

4.2 Micro-FTIR with Mapping Facility

The Micro-FTIR (Nicolet iS50 FTIR) combines conventional FTIR analysis with microscopic examination and mapping. It is capable of micro-scale analysis and high-resolution IR spectral mapping.

The facility has a spectral range of 350–7800 cm⁻¹ and spectral resolution of 0.09 cm⁻¹, with diamond and germanium ATR configurations.

From a pharmaceutical research perspective, this facility has potential applications in the investigation of drug–excipient interactions, chemical distribution, formulation components, structural characterization and biopharmaceutical samples.

4.3 3D Atom Probe Tomography – LEAP 6000 XR

The LEAP 6000 XR Atom Probe Tomography system is capable of atomic-scale three-dimensional characterization and time-of-flight mass spectrometry. The system provides very high spatial resolution and ppm-level elemental sensitivity. The brochure identifies it as India's first LEAP 6000 XR installed at SATHI-CISCoM.

Although primarily oriented toward advanced materials and inorganic systems, the capability demonstrates the very high level of characterization infrastructure available at the centre.

4.4 AFM and Tip-Enhanced Raman Scattering (TERS)

The NTEGRA Spectra TERS system integrates Atomic Force Microscopy with confocal Raman spectroscopy. It allows simultaneous topographical and chemical characterization at the nanoscale. The system also supports advanced AFM modes and Raman mapping, while TERS enables high-resolution chemical imaging.

This facility is particularly interesting for nanopharmaceutical research, nanomaterials, biomolecular characterization and surface-level investigation of pharmaceutical materials.



4.5 Transmission Electron Microscopy / S-TEM Facilities

The centre houses highly advanced JEM-ARM 200F systems with capabilities including aberration correction, electron holography, EDS, EELS and in-situ imaging.

The probe-corrected system provides STEM resolution of approximately 0.082 nm at 200 kV, while the image-corrected system provides atomic-resolution imaging and in-situ capabilities.

These capabilities are highly relevant for advanced investigations of nanoparticles, nanostructured materials and other samples requiring ultrastructural characterization.

5. Laser Scanning Confocal Microscope

The Nikon AXR Laser Scanning Confocal Microscope was another important facility discussed during the visit. It provides super-resolution fluorescence imaging with approximately 100 nm lateral and 300 nm axial resolution.

The system includes multiple laser lines and an sCMOS detector and is specifically identified as being suitable for bio/pharma applications, live-cell imaging and large-volume 3D reconstruction.

This facility has considerable potential for pharmaceutical and pharmacological research involving cellular imaging, drug effects, cellular uptake, localization and biological responses.

6. Rheometer with Optical Microscopy

The MCR 302e Rheometer with optical microscopy provides characterization of viscoelastic properties of complex fluids and soft materials such as colloids, polymer solutions, hydrogels and biomacromolecular systems.

The system can measure storage modulus, loss modulus and viscosity under different frequencies, strain, shear rates and temperatures. Importantly, its integrated digital microscope allows real-time visualization of microstructural changes during flow.

This facility is highly relevant to pharmaceutical formulation development, particularly for:

- Semisolid formulations
- Gels and hydrogels
- Polymer-based drug delivery systems
- Colloidal formulations
- Biomaterials



- Rheological characterization and quality assessment

7. High-Vacuum AFM

The Park NX-Hivac AFM provides high-vacuum atomic force microscopy and multimode imaging. The facility also provides thermal-stage and nanomanipulation capabilities and is identified for structural, functional and bio/pharmaceutical applications.

This could be useful for investigating surface morphology, nanoscale structures and pharmaceutical/nanopharmaceutical materials.

8. Advanced Sample Preparation Facilities

One of the important observations during the visit was that the centre has extensive sample preparation facilities, which are essential for obtaining reliable results from sophisticated microscopy systems.

During our visit, the importance of appropriate sample preparation, selection of suitable analytical technique and preparation of samples according to the requirements of individual instruments was particularly noted.

9. Relevance to Pharmaceutical and Pharmacological Research

The visit was particularly useful from the perspective of our Department of Pharmacology and the pharmaceutical research activities of our institution.

The SATHI-CISCoM documentation specifically identifies biological and pharmaceutical applications, including drug efficacy testing, bulk drug manufacturing, smart materials for organoids and cellular dynamics.

Based on our discussions during the visit and the facilities available, potential areas of utilization for our college include:

1. **Nanoparticle characterization:** Morphological and structural characterization of nanoparticles and nanocarriers.
2. **Drug delivery research:** Characterization of advanced drug delivery systems, polymeric systems, hydrogels and other novel formulations.
3. **Cellular imaging:** Confocal imaging for studying cellular responses, drug localization and cellular uptake.
4. **Drug–excipient interaction studies:** Micro-FTIR and related spectroscopic approaches for characterization of pharmaceutical formulations.



5. **Surface morphology and nanoscale characterization:** AFM and related techniques for investigating pharmaceutical and biomaterial surfaces.
6. **Rheological studies:** Characterization of gels, semisolids, polymeric systems and other formulation systems.
7. **Biological and pharmacological research:** Advanced imaging and characterization for studies involving cellular and biological models.
8. **Nanomaterial-based pharmacological research:** Advanced microscopy and spectroscopy for characterization of nanomaterials being investigated for therapeutic applications.

10. Opportunities for Collaboration

The visit also provided an opportunity to understand the wider collaborative potential of the SATHI-CISCoM network.

The facility is associated with several premier academic and R&D organizations, including IIT Hyderabad, University of Hyderabad, CCMB, IICT, ARCI, NIT institutions, Dr. Reddy's Laboratories, Bharat Biotech, LV Prasad Eye Institute, Amara Raja Group and TATA Steel, among others.

This is particularly relevant to our institution for developing:

- Collaborative research projects
- Faculty research projects
- Industry-sponsored research
- Consultancy projects
- Collaborative grant proposals
- Advanced characterization services for ongoing research

11. Important Observations During the Visit

Based on the interaction and the notes recorded during the visit, the following points were particularly noteworthy:

- The facility provides an integrated platform covering sample preparation, microscopy, spectroscopy and advanced characterization.
- Different microscopy platforms can be selected depending on the size, nature and composition of the sample.



- Sample preparation is a critical step before undertaking advanced microscopy.
- The facility has capabilities ranging from conventional micro-scale characterization to nanoscale and atomic-scale investigations.
- The combination of microscopy with spectroscopy provides both structural/morphological and chemical information.
- Particular importance is given to applications involving pharmaceutical, biological and materials research.
- The facility provides opportunities for researchers from academic institutions and industries to utilize sophisticated infrastructure.

12. Outcome of the Visit

The visit to SATHI-CISCoM was highly informative and provided us with a better understanding of the advanced analytical infrastructure available at IIT Hyderabad.

The interaction helped us identify several possibilities for applying sophisticated characterization techniques to our ongoing and proposed research activities in pharmacology, pharmaceutical sciences, nanotechnology, drug delivery, formulation development and biological research.

The visit also highlighted the possibility of establishing institutional research linkages and collaborative projects with SATHI-CISCoM and its associated institutions. The facility's stated objectives include supporting researchers, students, industries and R&D laboratories through advanced infrastructure.

Impact of the Visit

The visit to SATHI-CISCoM, IIT Hyderabad provided valuable exposure to advanced research and characterization facilities and helped identify opportunities for their utilization in pharmaceutical, pharmacological and interdisciplinary research. It also opened avenues for faculty and student research, collaborative projects, advanced characterization, funded research and industry–academia interaction through the SATHI-CISCoM network

13. Recommendations

Based on the visit, the following activities may be considered by our institution:

1. Explore the possibility of establishing a formal research collaboration/MoU with SATHI-CISCoM/IIT Hyderabad, wherever appropriate.
2. Identify ongoing faculty research projects that can benefit from advanced microscopy and characterization.



3. Encourage M.Pharm, Pharm.D and Ph.D. scholars to utilize suitable SATHI-CISCoM facilities for their research.
4. Develop collaborative research proposals involving faculty from pharmacy and researchers at IIT Hyderabad and other SATHI cluster institutions.
5. Explore opportunities for industry-sponsored research and consultancy.
6. Conduct awareness/orientation programmes for faculty and research scholars regarding the available facilities and sample requirements.
7. Consider utilizing the facility for advanced characterization of nanoparticles, drug-delivery systems, formulations, biomaterials and biological samples.

14. Conclusion

The visit to the SATHI Centre for In-Situ & Correlative Microscopy (SATHI-CISCoM), IIT Hyderabad, on 19 September 2026 was an academically and scientifically valuable experience. The centre has an impressive range of sophisticated facilities, including FIB, Micro-FTIR, Atom Probe Tomography, AFM/TERS, advanced TEM/STEM, confocal microscopy, rheometry and specialized sample-preparation facilities.

The availability of facilities specifically relevant to bio/pharmaceutical research, drug efficacy studies, cellular dynamics and advanced materials makes the centre particularly valuable for pharmacy-related research.

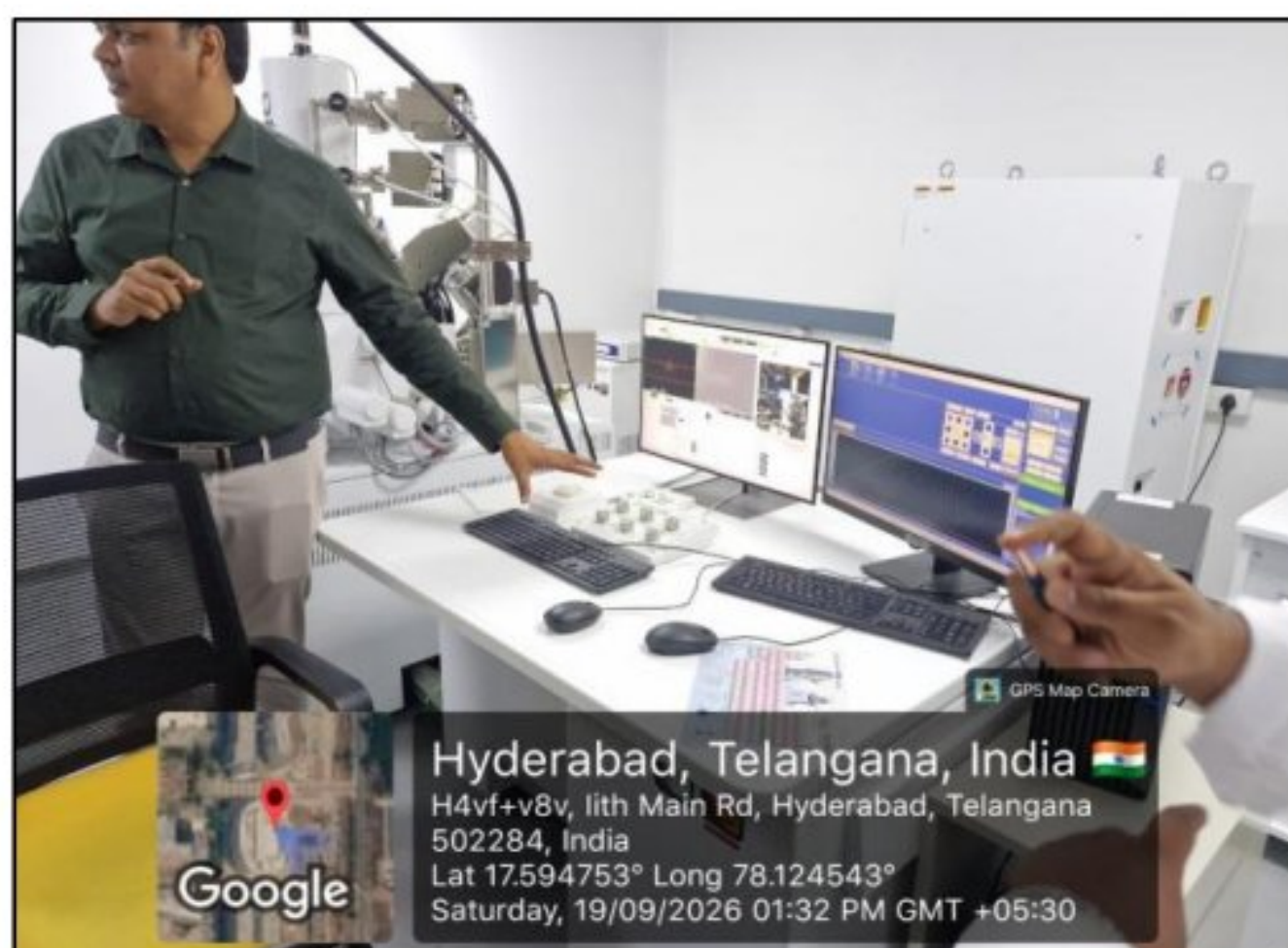
I therefore consider the visit useful for identifying future avenues for advanced characterization, collaborative research, student projects, faculty research and industry-academia interaction. The information gathered during the visit may be shared with the concerned faculty and research scholars of our institution for exploring appropriate utilization of the SATHI-CISCoM facility.



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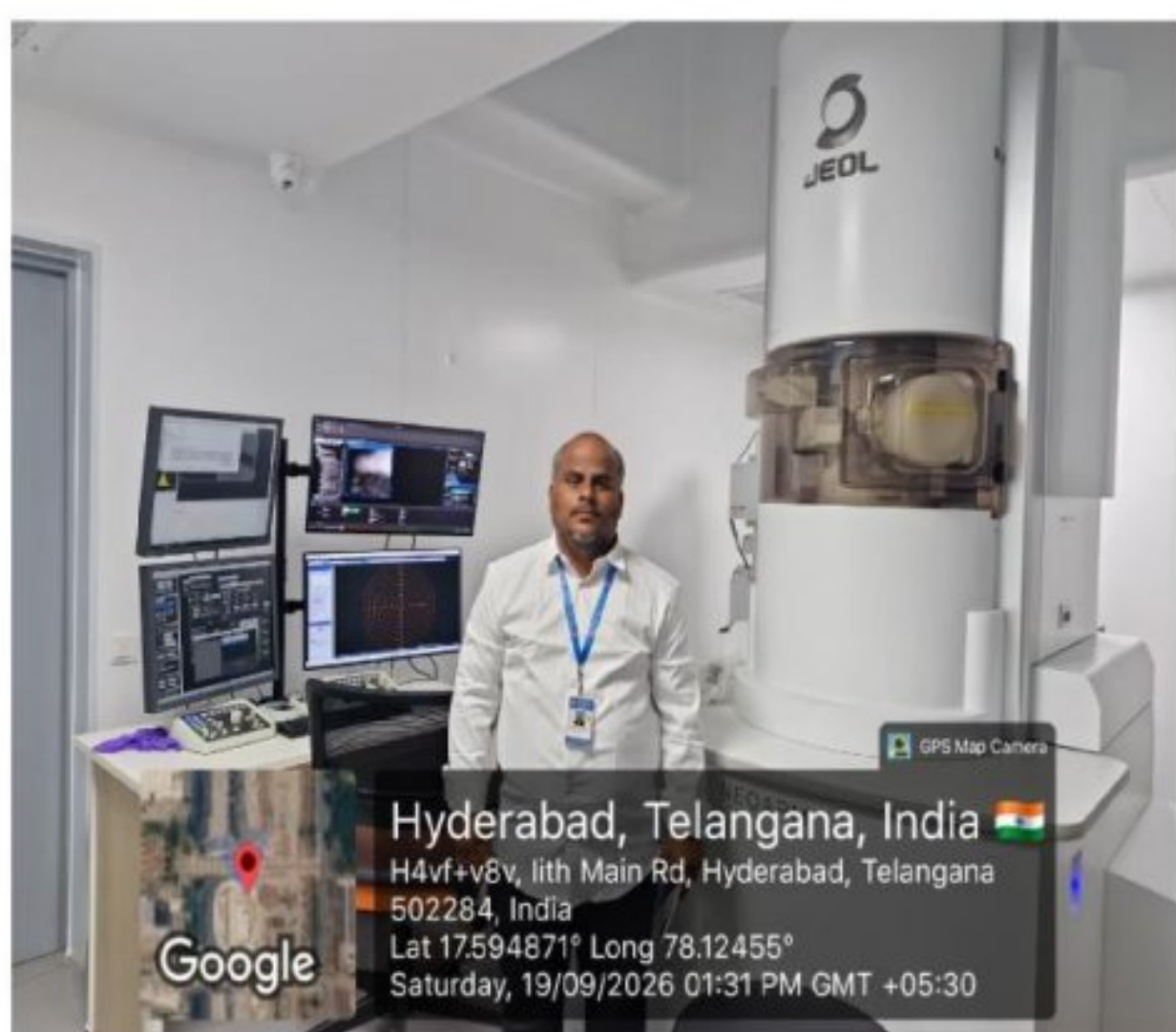
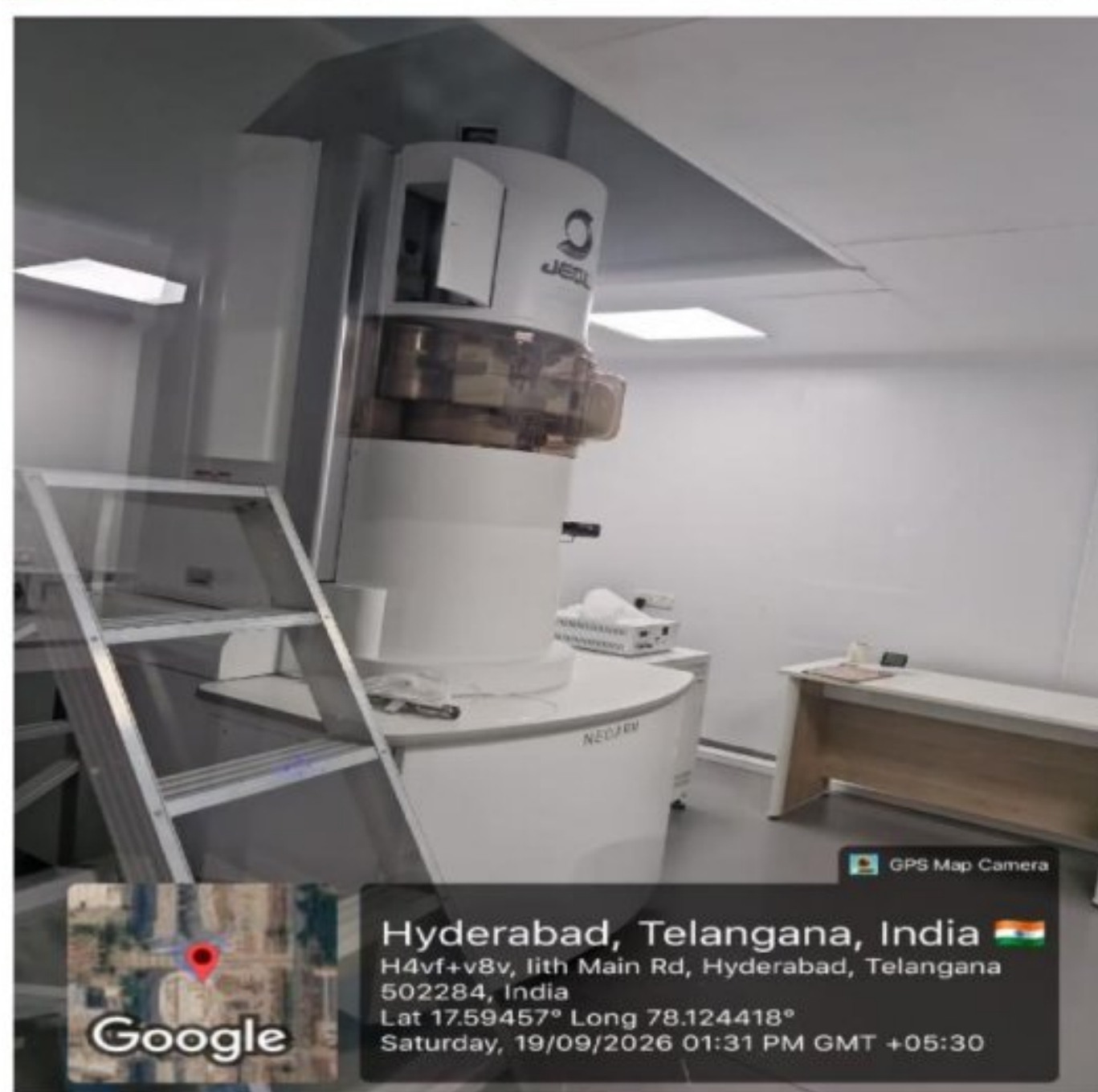




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