



RFP UJ 30/2025: PROCUREMENT OF AN ATOMIC FORCE MICROSCOPE (AFM)

1. EQUIPMENT DESCRIPTION AND BACKGROUND – REASON FOR PURCHASE

The acquisition of an Atomic Force Microscope equipped with a Kelvin probe (KPAFM) will be beneficial to the training of undergraduate national diploma and post graduate advanced diploma students. Chemistry is experimental and proof of theory is complemented by practical's that are designed to relate content covered in lecture halls. Level three and four modules offered in year 3 and 4 expose students' instrumental techniques which gives them an added advantage and a seamless transition to the workplace. In the department, we offer Polymer Chemistry III (CETPCA3), Materials and Processing III (CETMPA3) and Advanced Organic Chemistry IV (CHM7XP4) at exit level, where students make use of highly specialized instrumentation.

The KPFM will give students in-depth knowledge of the materials they prepare, including surface topography, surface roughness, work-function, including magnetic properties. In polymer chemistry, students learn to prepare different polymers, and it is essential that they characterize the polymers and KPFM is an indispensable tool that will enable students to discern the quality of the polymer they have prepared while linking the concepts gained during theory session. Students will also appreciate the versatility of the KPAFM when they engage with practical's in Organic Chemistry IV and Materials and Processing, where in Organic IV they prepare organic nanomaterials such as organic conducting polymers. KPAFM will be a vital tool to measure the properties that promote polymer conductivity.

Providing irrefutable evidence of the "unseen -microscopic world" of charge carries, will cement the abstract content covered in theory through data driven conclusions. And acquiring the skill of data-driven approach to our students is essential in a world hounded by disinformation/misinformation. Our students being exposed to hard-core scientific principles empowers them to face the outside world armed with both theory and evidence-based knowledge, and KPAFM will be pivotal. In materials and processing, students will use the KPAFM to measure surface roughness of the membranes they prepare, applied in water treatment process. Students will have an opportunity to compare and contrast the role played additives incorporated on the membranes, thus monitor any changes on the surface topography of a membrane and how the membrane performance is influenced. These experiments are designed to enlighten our students the role chemistry plays at mitigating and improving real-life problems and the KPAFM is instrumental in delivering world-class teaching and learning environment.

The Department of Chemical Sciences currently has several UG modules that use the AFM equipment as mentioned in table 1.

Table 1: Current modules that uses AFM for practical training of UG and Advanced Diploma students

Module Code	Brief description of practical	Approximate number of students in the practical
CHM7XP4	Preparation and characterization of organic conductive polymer materials. Students will use KPAFM to determine charge carriers produced by conductive polymer. They will also compare non-conductive polymers. The practical links to their theory covered in their lectures – pericyclic and sigmatropic reactions.	20
CETPCA3	Preparation and characterization of radical, cationic and anionic polymers such as polyethylene, polypropylene and polyvinyl chloride. KPAFM will be used to measure the surface properties of the prepared materials thus providing insight on the effect of physicochemical properties of the polymer when different groups are introduced on the monomer.	89
CETMPA3	Students will prepare a membrane - PANI and Cellulose acetate – both non-biodegradable and biodegradable membranes where photo/catalytic nanomaterials will be embedded applied in water treatment. KPAFM will be used to measure the role surface roughness has on flux and fouling of the membrane. The embedded nanomaterials work functions will be determined by KPAFM to assess their photocatalytic properties.	89

2. SPECIFICATIONS OF INSTRUMENT

- Top grade bench top system
 - XYZ Scan range – 100 x 100x 10µm or better
 - Drive resolution – XY<6pm, Z <0.6pm or better
 - XY linearity mean error <0.1% or better
- Standard operating modes:
 - Contact
 - Non-contact
 - Dynamic Phase
 - Magnetic/Electrostatic Force
 - Force Modulation
 - Spreading Resistance
 - Lateral Force
 - Spectroscopy and Lithography
- Advanced modes:
 - Dual pass KPFM
- 32bit Controller with dual digital lock-in
- XY Micrometer sample stage
- Motorized Z-stage
- Integrated Camera - Top and side view
- Integrated active vibration isolation system

3. INSTALLATION AND COMMISSION

The equipment must have a minimum of 12 months warranty or offer an extended period.

Delivery required to the point of operation.

The supplier is required to do installations and commissioning of the equipment.

The Supplier is required to provide training as well as a training Manuel on how to use the machine.

4. SUPPORT AND MAINTENANCE

The service provider must provide,

- maintenance and service support including ad hoc services and additional consumables
- Provide details in the event of power failure, technical difficulties, or spares unavailability
- After-hours and emergency services: Provide details of support services for the University of Johannesburg end-users.

5. EVALUATION CRITERIA

The tender will be evaluated in 3 stages,

1. Stage 1: Tender Compliance
2. Stage 2: Technical compliance
3. Stage 3: Financial and B-BBEE

Stage 2: Technical Evaluation Criteria

No	Area	Technical Criteria	Maximum Points
(i)	Industry Experience	The service provider must have a minimum of five (5) years' experience in similar industry Bidder Experience 0 Years' Experience = 0 Points 1 Years' Experience = 10 Points 2 Years' Experience = 20 Points 3 Years' Experience = 30 Points 4 Years' Experience = 40 Points 5 Years' Experience and more = 50 Points	50 points
(ii)	Contactable references	The service provider must provide five (5) positive written contactable references indicating similar services rendered. The reference letters from the clients of a bidder must include: • Supplier name • Client letterhead • Contact person and contact telephone numbers • The letter must be signed by a duly authorized person. Bidders Reference Letters 0 Reference Letters = 0 Points 1 Reference Letters = 10 Point 2 Reference Letters = 20 Points 3 Reference Letters = 30 Points 4 Reference Letters = 40 Points 5 Reference Letters and more = 50 Points	50 points
	Total		100

A bidder must obtain a minimum of 70 points in stage 2 evaluation above, to be considered for further evaluation in terms of stage 3: financial and B-BBEE.

Stage 3: Financial and B-BBEE

