

**VERBALE n.12 DELLA RIUNIONE DELLA COMMISSIONE SUPERVISIONE E
MONITORAGGIO**
Progetto X-CHEM – Dipartimenti di Eccellenza 2023-2027

La Commissione Supervisione e Monitoraggio (CSM) del Progetto X-CHEM si è riunita in data 11/10/2024 alle ore 12:30 per discutere il seguente o.d.g.:

1. Comunicazioni
2. Progetti di ricerca
3. Infrastrutture
4. Reclutamento
5. Varie ed eventuali

Sono presenti i Proff.

Fabiana Arduini

Massimo Bietti

Valeria Conte

Elisabetta Di Bartolomeo

Silvia Licoccia

Roberto Paolesse

Silvia Orlanducci

Francesco Ricci

Mariano Venanzi

Assume le funzioni Presidente la Prof.ssa Valeria Conte, Coordinatrice del progetto, e quelle di Segretario la Prof.ssa Silvia Licoccia.

Constatato che l'assemblea è validamente costituita, la Presidente dà inizio alla riunione.

1) Comunicazioni

- La prof.ssa Conte comunica che è in fase di preparazione la rendicontazione finanziaria e scientifica del II anno di progetto che prosegue in linea con quanto proposto, con qualche lieve ritardo solo nell'aspetto del reclutamento (vedi punto 5 all'odg).

2) Progetti di ricerca

- La Prof.ssa Conte informa che non è possibile cofinanziare, come originariamente prospettato, i progetti di ricerca a valere su fondi di Ateneo con fondi del progetto X-CHEM in quanto tale voce di bilancio non è presente nel progetto stesso. Propone pertanto di utilizzare una procedura già attuata da altri Dipartimenti, ovvero spostare la quota di 53.000,00 € sul capitolo premialità e distribuirla a tutti i componenti del Dipartimento con il peso di 1 per i Ricercatori, 0.7 per i Professori Associati e 0.5 per i Professori ordinari. In tal modo, sia pure con una piccola erogazione, si intende riconoscere il contributo di tutti all'attuazione del progetto. Propone che tali fondi però non siano distribuiti come premialità stipendiale ma rimangano nel bilancio del Dipartimento in un unico capitolo di spesa da utilizzare per spese di interesse comune.

La Commissione approva all'unanimità.



3) Infrastrutture

– La Prof.ssa Orlanducci illustra le caratteristiche tecniche auspicabili per l'apparato AFM scelte sulla base delle attività di ricerca del dipartimento e dei limiti di spesa previsti (Cfr. All.1).

Sarà pertanto avviata la procedura di gara per l'acquisto dello strumento.

La Commissione dà mandato alla Prof.ssa Orlanducci di coordinarsi con la Sig.ra Gallenzi per dare avvio alla procedura.

– La Prof.ssa Orlanducci informa altresì che la consegna e conseguente collaudo della strumentazione Raman è stata rinviata, d'accordo con i fornitori, alla conclusione dei lavori di ristrutturazione del laboratorio che ospiterà la strumentazione stessa.

La Commissione prende atto e ringrazia la Prof.ssa Orlanducci per il lavoro fatto.

– La Prof.ssa Conte informa che, al momento la spesa relativa alle infrastrutture consiste in:

256.000,00 €	Raman
650.000,00 €	SEM (comprensivo di metallizzatore)
250.000,00 €	AFM (spesa prevista ma che andrà consolidata al termine della procedura di acquisto)
195.000,00 €	Altra strumentazione già deliberata
34.000,00 €	Ristrutturazione e riqualificazione laboratori (comprensivo di condizionatori)
15.000,00 €	Arredi
10.000,00 €	Varie
1.410.000,00 €	Totale

Pertanto, a fronte del valore del capitolo di bilancio di 1.500.000,00 € e una volta sottratta la cifra da destinare in premialità di cui sopra, si ottiene un residuo di 37.000,00 €.

La Commissione delibererà all'unanimità di destinare tale cifra alla ristrutturazione dell'Aula Seminari del Dipartimento.

4) Reclutamento

– La Prof.ssa Conte comunica che sono state completate quasi tutte le procedure di reclutamento previste con l'eccezione di una posizione TAB-area tecnica livello D e una posizione di RTT per il SSD CHIM/03. Propone pertanto di programmare a breve una riunione della Commissione Programmazione del Dipartimento per procedere con i passi necessari all'espletamento di tutte le procedure.

La Commissione ringrazia la Prof.ssa Conte e approva.

5) Varie ed eventuali

– La Prof.ssa Conte esprime alla Commissione la propria soddisfazione per l'ottima qualità scientifica e organizzativa del I workshop X-CHEM tenutosi in settembre e propone di



organizzare un secondo workshop al termine del IV anno di progetto. La Commissione ringrazia la Prof.ssa Conte e approva.

6) Varie ed eventuali

Nulla da discutere.

Non avendo più nulla da discutere la seduta è tolta alle ore 16:30.

Il presente verbale viene letto, approvato e sottoscritto seduta stante.

La Segretaria
Prof.ssa Silvia Licoccia

La Coordinatrice del progetto
Prof.ssa Valeria Conte



Allegato 1.

Part Num.	Description	scelte proposte Domenici-Orlanducci
010-0020	<p align="center">NX10 Complete AFM System</p> <p>Complete Atomic Force Microscope system for small and medium size samples, consisting of flexure-guided XY scanner (select preferred option from below), AFM head (select preferred option from below), direct on-axis optics (select preferred option from below), sample mount, motorized XY stage, motorized Z stage, motorized focus stage, NX control electronics, SmartScan™ software, XEI software, computer, monitors, cabinet, table and accessories.</p> <p>Requirements</p> <ul style="list-style-type: none"> ▪ SELECT one of the XY scanner options (010-0280, 010-0260, 010-0270) ▪ SELECT one of the SPM head options (010-0110, 010-0139-1) ▪ SELECT one of the vision camera options (723-0040, 080-0066) ▪ SELECT one of the computer options (100-9051, 100-9053) <ul style="list-style-type: none"> ▪ NOTE: System performance is optimized with the acoustic enclosure options (380-3020, 080-3203, 080-3209) ▪ NOTE: System performance is optimized with vibration isolation option (780-0420). 	<p>XY= 100x100 μm^2 ; z = 30 nm</p>
XY Scanner Options - SELECT ONE		
010-0280	<p>10 μm XY Scanner</p> <ul style="list-style-type: none"> ▪ Flexure-guided XY scanner structure for the sample scanning and positioning, separated from the topography feedback mechanism of the Z scanner ▪ Flexure-guided structure minimizes background curvature ▪ Replaces the default XY Scanner ▪ XY scan range: 10 μm \times 10 μm typical ▪ Closed-loop feedback control for precise XY positioning ▪ 20-bit XY position control and 24-bit XY positioning sensor 	si
010-0260	50 μm XY Scanner - DEFAULT	



- Default XY Scanner
 - Flexure-guided XY scanner structure for the sample scanning and positioning, separated from the topography feedback mechanism of the Z scanner
 - Flexure-guided structure minimizes background curvature
 - XY scan range: 50 μm \times 50 μm typical
 - Closed-loop feedback control for precise XY positioning
 - 20-bit XY position control and 24-bit XY positioning sensor
- **NOTE:** If desires other than default 50 x 50 μm range, select the XY scanner of different scan range.

010-0270

100 μm XY Scanner

- Flexure-guided XY scanner structure for the sample scanning and positioning, separated from the topography feedback mechanism of the Z scanner
- Flexure-guided structure minimizes background curvature
- Replaces the default XY Scanner
- XY scan range: 100 μm \times 100 μm typical (in open loop)
- Closed-loop feedback control for precise XY positioning
- 20-bit XY position control and 24-bit XY positioning sensor

Si

SPM Head Options - SELECT ONE

010-0110

Standard NX AFM Head with Decoupled Flexure-Guided Z Scanner - DEFAULT

- Default AFM Head
 - Includes a high-force Z scanner
 - Flexure-guided structure driven by multilayer piezoelectric actuator
 - Z scan range: 15 μm
 - 20-bit Z position control and 24-bit Z position sensor
 - Includes standard probhead where a cantilever is attached
 - NCM oscillation frequency: Up to 3 MHz
 - Bias voltage range to the cantilever: -10 V to 10 V
 - Detects the deflection of the cantilever using SLD (Super Luminescent Diode) for topography feedback
 - SLD wavelength: 830 nm
 - SLD has low coherence to reduce optical interference
 - Dovetail-lock head mount for easy installation and removal of the AFM head
 - Automatically connects to the electronics upon installation
- **NOTE:** If desires SICM head instead of default Standard NX AFM Head, select the SICM head module only option (010-0139-1).

010-0139-1

SICM Head Module for NX10 (Without AFM Head)



- Replaces AFM Head to SICM Head
- SICM Head with clip-type pipette holder
- Includes a low-noise, high-precision current amplifier
- Includes a high-force Z scanner
 - Flexure-guided structure driven by multilayer piezoelectric actuator
 - Z scan range: 15 μm
 - 20-bit Z position control and 24-bit Z position sensor
- Dovetail-lock head mount for easy installation and removal of the SICM head
- Includes glass nano-pipettes (50 ea.)
 - Image resolution: Comparable to the inner diameter of the pipette in the lateral direction
 - Inner diameters of the pipettes: 80 ~ 100 nm (glass)
- Includes Ag/AgCl electrode wire for SICM bath solution
- Includes a test sample for SICM

- **REQUIRES** Faraday Cage for NX10 (310-0347) for better noise performance
- **NOTE:** NOT compatible with NX Modes and Options.

010-0119-1 SICM Long Travel Head Module for NX10 (Without AFM Head)

- Replaces AFM Head to SICM Long Travel Head
- SICM Head with clip-type pipette holder
- Includes a low-noise, high-precision current amplifier
- Includes a high-force Z scanner
 - Flexure-guided structure driven by multilayer piezoelectric actuator
 - Z scan range: 30 μm
 - 20-bit Z position control and 24-bit Z position sensor
- Dovetail-lock head mount for easy installation and removal of the SICM head
- Includes glass nano-pipettes (50 ea.)
 - Image resolution: Comparable to the inner diameter of the pipette in the lateral direction
 - Inner diameters of the pipettes: 80 ~ 100 nm (glass)
- Includes Ag/AgCl electrode wire for SICM bath solution
- Includes a test sample for SICM

- **REQUIRES** Faraday Cage for NX10 (310-0347) for better noise performance
- **NOTE:** Not compatible with NX Modes and Options.

si

Vision Camera Options - SELECT ONE

723-0040

Direct On-Axis Optics with CCD and LED Illumination (1.2 M Pixel Vision Camera Option) - DEFAULT



- Default Camera option
 - Intuitive direct on-axis sample view from top
 - Integrated 10x objective lens
 - 1.2 M Pixel CCD camera
 - Field of view: 480 μm x 360 μm (with 10x objective lens)
 - Includes integrated software-controlled white LED illumination*
- **NOTE:** If desires other than default 1.2 M pixel CCD Camera, select the 5 M Pixel Vision Camera Option (080-0066)
* **NOTE:** Other LED wavelength options are available. Consult Park Systems for details.

ok

Computer Options

100-9051

Computer with Dual Monitors - DEFAULT

- Intel® Core™ i5 CPU or compatible
 - 16 GB DRAM
 - 2 x 1 TB Hard Disc Drives
 - Dual 23 inch LCD monitors (1920 x 1080 pixel, DVI)
 - Graphic card: GeForce GT1030 or compatible
 - Operating System: Microsoft Windows 10 Professional 64 bit (English)
- **NOTE:** Specification of the computer is subject to change without notice. Consult Park Systems for details.

ok

Sample Mount

- Sample plate to place the sample
- Sample size
 - Open space up to 100 x 100 mm (Sample size less than 40 x 40 mm recommended), 20 mm thickness
- Includes a magnetic sample holder
- Bias voltage range to the sample: -10 V to 10 V

Motorized XY Stage

- Motorized sample stage for sample positioning in the XY direction
- Stage travel range: 20 mm x 20 mm

ok

Motorized Z Stage

- Motorized stage for AFM head movement in the Z direction
- Automatic engage of the cantilever to the sample surface
- Stage travel range: 25 mm
- Stage travel step: 0.08 μm

ok

Motorized Focus Stage for On-Axis Optics



- Motorized stage for vision focus
- Stage travel range: 15 mm
- Stage travel step: $\sim 0.06 \mu\text{m}$

ok

NX Control Electronics

- 17 DACs for signal generation
 - 2 high-speed 16-bit DACs
 - 20-bit DACs for X, Y, and Z scanner positioning
- 18 ADCs for signal acquisition
 - 4 high-speed 16-bit ADCs
 - 24-bit ADCs for X, Y, and Z scanner position sensor
- Maximum AFM data size: 4096 x 4096 pixels*
- Four channels of integrated digital lock-in amplifier
- Digital Q control
- 6 digital I/Os in LV-TTL
 - Image frame, line, pixel, cantilever-modulation sync, tip bias-modulation sync, and alarm
- Integrated signal access ports for AFM signals
 - 7 inputs and 3 outputs
- 100 Mbps communication with the PC
- CE compliant

ok

* **NOTE:** For more than 4096 x 4096 pixels, please consult with Park Systems.

Supported AFM/SPM Modes

Standard Modes

- Supports standard AFM/SPM modes without additional software/hardware option
 - True Non-contact mode, Tapping mode, and Phase imaging
 - Contact mode and LFM (Lateral Force Microscopy)
 - F/d (Force/distance) spectroscopy and Force volume imaging
 - PinPoint™ mode: Includes PinPoint imaging
 - Fast Imaging
 - Active Q-control
 - Spring constant calibration by thermal vibration method

Advanced Modes

- Performs advanced AFM/SPM modes without additional software/hardware option
 - MFM (Magnetic Force Microscopy)
 - Enhanced EFM (EFM, DC-EFM, PFM and KPFM)
 - FMM (Force Modulation Microscopy)
 - Nanoindentation

ok

- **NOTE:** Requires relevant cantilevers for each mode
- **NOTE:** For better operation, relevant starter kit is needed for each mode. Refer to NX Modes Accessories section.



PinPoint™ Nanomechanical Property Mapping

- Provides nanomechanical property mapping mode
- Acquired data type: Deformation, Adhesion force, Adhesion energy, Energy dissipation, and Approach and retract stiffness
- F/d curve control: Maximum force, Tip traveling range, Speed
- Young's modulus model : Hertzian, JKR and DMT model
- Modulus range: Up to 100 GPa, selecting cantilever depends on the sample modulus

ok

StepScan Functionality

- Enables automatic sequential imaging of a sample at the user selected coordinates
- The process comprises of 1) image scanning 2) cantilever retract 3) move to the next selected coordinate 4) tip approach 5) image scanning 6) repeat

ok

SmartScan™ Operating Software

- Data acquisition and operating software
- Auto mode to produce high quality imaging through three simple clicks
- Manual mode to control all the functions and settings for AFM scans
- Program mode for executing multiple measurements
- Includes Fast Approach, Adaptive Scan
- Operation wizard for easy AFM usage
- Integrated optical view window for easy sample vision view
- Scripting tools with Park API for advanced automation

ok

XEI Image Analysis Software

- Independent software for image processing, data analysis and data presentation support
- Runs on the Windows OS provided with the system

ok

Accessories

- 10 pre-mounted contact cantilevers and 10 pre-mounted non-contact cantilevers
- Includes standard clip-type chip carrier and cantilever exchanger
- Includes Fast Imaging probehead (310-0139)
- Includes a calibration grating for lateral/vertical calibration (1 ea.)
- Includes an IR detection kit to locate the position of the SLD beam
- Sample disks (700-0954, 10 ea.)
- Manuals
- Includes table and cabinet
- Controller and PC can be stored inside the cabinet, and monitors are setup on the table

ok

One Year Warranty Coverage



The warranty coverage that conforms to the Warranty Statement is extended for a period of one year commencing on final acceptance or 90 days from shipping, whichever occurs first

- Covers the parts and labor of a warranty repair done at Seller's site
- Excludes consumables
- Freight charges and shipments to Seller are Buyer's responsibility

▪ **NOTE:** Seller assumes no liability under the above warranties for equipment or system failures including but not limited to as follows; resulting from negligence, misuse, accident, misapplication, modification or mishandling.

Recommendation

- **NOTE:** System performance is optimized with the acoustic enclosure options (380-3020, 080-3203, 080-3209)
- **NOTE:** System performance is optimized with vibration isolation option (780-0420).

ok 2 anni e 3 premiali

Acoustic Enclosure & System Base Options

380-3020

Table-top Acoustic Enclosure - AE 101

- Table-top designed Acoustic Enclosure
- Environmentally sealed acoustic enclosure to block external acoustic and light noise
- Ergonomic design for user convenience
- Dimension: 510 x 715 x 630 mm (outer dimension W x D x H)
- Weight: 40 kg
- **REQUIRES** Active Vibration Isolation Tables (780-0420)
- **NOTE:** For using Table-top AE 101, System Granite Table (080-3015) is strongly recommended. It can be purchased as an option or can also be purchased locally.

080-3203

Stand-alone Acoustic Enclosure - AE 203 - RECOMMENDED

- Environmentally sealed acoustic enclosure to block external acoustic and light noise
- Ergonomic design for user convenience
- Stand-alone system design
- Dimension: 700 x 800 x 1345 mm (outer dimension W x D x H)
- Weight: 300 kg
- **REQUIRES** Active Vibration Isolation Table (780-0420).

si

080-3015

System Granite Table



	<ul style="list-style-type: none">▪ Table top is composed of polished granite material▪ Strongly recommended for using with Table-top AE 101 (380-3020)▪ Dimension : 800 x 700 x 590 mm, 170kg	
Vibration Isolation Options		
780-0420	<i>Active Vibration Isolation - AVI 01 - RECOMMENDED</i> <ul style="list-style-type: none">▪ Provides active vibration isolation to cancel out the floor vibration▪ Strongly recommended for high resolution imaging▪ Dimension : 400 x 500 x 80 mm, 20kg	si
Additional XY Scanner Options		
010-0281	10 μm XY Scanner <ul style="list-style-type: none">▪ XY scan range: 10 μm x 10 μm typical▪ Closed-loop feedback control for precise XY positioning▪ 20-bit XY position control and 24-bit XY positioning sensor	si
010-0261	50 μm XY Scanner <ul style="list-style-type: none">▪ XY scan range: 50 μm x 50 μm typical▪ Closed-loop feedback control for precise XY positioning▪ 20-bit XY position control and 24-bit XY positioning sensor	
010-0271	100 μm XY Scanner <ul style="list-style-type: none">▪ XY scan range: 100 μm x 100 μm typical (open loop)▪ Closed-loop feedback control for precise XY positioning▪ 20-bit XY position control and 24-bit XY positioning sensor	di default
Additional SPM Head Options		
010-0111	Standard NX AFM Head with Decoupled Flexure-Guided Z Scanner	



- Includes a high-force Z scanner
 - Flexure-guided structure driven by multilayer piezoelectric actuator
 - Z scan range: 15 μm
 - 20-bit Z position control and 24-bit Z position sensor
- Includes standard probhand where a cantilever is attached
 - NCM oscillation frequency: Up to 3 MHz
 - Bias voltage range to the cantilever: -10 V to 10 V
- Detects the deflection of the cantilever using SLD (Super Luminescent Diode) for topography feedback
 - SLD wavelength: 830 nm
 - SLD has low coherence to reduce optical interference
- Dovetail-lock head mount for easy installation and removal of the AFM head
 - Automatically connects to the electronics upon installation.

si

010-0115

Long Travel NX AFM Head

- NX AFM head for extended Z scan range
- Includes a high-force Z scanner with extended travel range
 - Flexure-guided structure driven by multilayer piezoelectric actuator
 - Z scan range: 30 μm
 - 20-bit Z position control and 24-bit Z position sensor
- Includes standard probhand where a cantilever is attached
 - NCM oscillation frequency: Up to 3 MHz
 - Bias voltage range to the cantilever: -10 V to 10 V
- Detects the deflection of the cantilever using SLD (Super Luminescent Diode) for topography feedback
 - SLD wavelength: 830 nm
 - SLD has low coherence to reduce optical interference
- Dovetail-lock head mount for easy installation and removal of the AFM head
 - Automatically connects to the electronics upon installation

di default

010-0139

SICM Head Module for NX10

- **NOTE:** NOT compatible with Conductive AFM (080-1110, 080-1008, 080-1009), SCM (080-0306), SSRM (080-2105), STM (080-0910), and SThM (080-0405) options.



- SICM Head with clip-type pipette holder
- Includes a low-noise, high-precision current amplifier
- Includes a high-force Z scanner
 - Flexure-guided structure driven by multilayer piezoelectric actuator
 - Z scan range: 15 μm
 - 20-bit Z position control and 24-bit Z position sensor
- Dovetail-lock head mount for easy installation and removal of the SICM head
- Includes glass nano-pipettes (50 ea.)
 - Image resolution: Comparable to the inner diameter of the pipette in the lateral direction
 - Inner diameters of the pipettes: 80 ~ 100 nm (glass)
- Includes Ag/AgCl electrode wire for SICM bath solution
- Includes a test sample for SICM

- **REQUIRES** Faraday Cage for NX10 (310-0347) for better noise performance
- **NOTE:** NOT compatible with NX Modes and Options.

010-0119

SICM Long Travel Head Module for NX10

- SICM Head with clip-type pipette holder
- Includes a low-noise, high-precision current amplifier
- Includes a high-force Z scanner
 - Flexure-guided structure driven by multilayer piezoelectric actuator
 - Z scan range: 30 μm
 - 20-bit Z position control and 24-bit Z position sensor
- Dovetail-lock head mount for easy installation and removal of the SICM head
- Includes NX10 SICM Faraday Cage
- Includes glass nano-pipettes (50 ea.)
 - Image resolution: Comparable to the inner diameter of the pipette in the lateral direction
 - Inner diameters of the pipettes: 80 ~ 100 nm (glass)
- Includes Ag/AgCl electrode wire for SICM bath solution
- Includes a test sample for SICM

- **REQUIRES** Faraday Cage for NX10 (310-0347) for better noise performance
- **NOTE:** Not compatible with NX Modes and Options.

si

Conductive AFM Options

080-1110

Internal Conductive AFM (C-AFM) for NX



- Measures the conductivity of a sample with high lateral resolution
 - Includes the conductive AFM module, software, test sample and manual
 - Gain range: 7 steps (10^6 to 10^{12} V/A)
 - Maximum measurable current range: $-10 \mu\text{A}$ to $10 \mu\text{A}$ (at 10^6 V/A gain)
 - Noise level: ~ 0.4 pA (rms, at 10^9 V/A gain)
 - Includes PinPoint™ conductive AFM
 - Includes un-mounted conductive cantilevers (9 ea.)
 - Includes Clip-type Proband for NX (700-0939)
- **NOTE:** For using standard proband with conductive AFM, insulated chip carrier pre-mounted conductive cantilevers are needed.

080-1008

Variable Enhanced Conductive AFM (VECA) for NX

- Measures the conductivity of a sample with high lateral resolution and sensitivity
 - Provides higher sensitivity and wider electric current range
 - Includes the VECA module with a variable gain, low-noise current amplifier with power supply, software, test sample and manual
 - Gain range: 7 steps (10^3 to 10^9 V/A)
 - Maximum measurable current range: -10 mA to 10 mA (at 10^3 V/A gain)
 - Noise level: ~ 0.3 pA (rms, at 10^9 V/A gain)
 - Includes PinPoint™ conductive AFM
 - Includes un-mounted conductive cantilevers (9 ea.)
 - Includes Clip-type Proband for NX (700-0939)
- **NOTE:** For using standard proband with conductive AFM, Insulated Chip Carrier pre-mounted conductive cantilevers are needed.

080-1020

Photo Current Mapping (PCM) for NX



080-0905	<ul style="list-style-type: none"> ▪ Measures photoelectric response to a time-resolved illumination ▪ Includes laser illumination module, software and test sample <ul style="list-style-type: none"> - Laser ON/OFF, sample bias control - Acquisition time resolution: 20 μs - Analysis function provided for photocurrent curves decay time in XEI ▪ Laser* <ul style="list-style-type: none"> - Wave length : 635 nm (Red, default laser) - Power : 5 mW(default) - Modulation : 300 kHz ▪ Sample bias : ± 10 V ▪ Photo current curve data depth: max. 4096 Points (less than 81.92 ms) <p>▪ REQUIRES VECA (080-1008) option * NOTE: Other Laser wavelength and power options (405 nm to 785 nm, 1 mW to 75 mW) are available. Consult Park Systems for details Using higher power laser (>5 mW) requires extreme care from customer.</p>	Premiali
700-0939	<p>STM Tool Kit for NX</p> <ul style="list-style-type: none"> ▪ Scanning Tunneling Microscopy Tool Kit applicable to pre-existing current amplifier ▪ Add on Tool Kit to the C-AFM (080-1110), VECA (080-1008) ▪ Includes STM probehead, HOPG test sample, software, and manual ▪ Includes Pt-Ir STM probes (3 ea.) <p>▪ REQUIRES C-AFM (080-1110) or VECA (080-1008) option.</p> <p>Clip-type Probehead for NX</p> <ul style="list-style-type: none"> ▪ Probehead for un-mounted cantilever <ul style="list-style-type: none"> - Non-magnetic tip holding mechanism ▪ Tip bias applicable from - 10 V to +10 V <p>▪ NOTE: Recommended for low-noise C-AFM measurements.</p>	si
Other NX Modes		
080-0910	STM for NX	



080-0405	<ul style="list-style-type: none">▪ Scanning Tunneling Microscopy▪ Includes the STM current amplifier module, software, test sample and manual<ul style="list-style-type: none">- Gain range: 7 steps (10^6 to 10^{12} V/A)- Maximum measurable current: 10 μA- Noise level: ~ 0.4 pA (rms, at 10^9 V/A gain)▪ Includes STM probehead, HOPG test sample▪ Includes Pt-Ir STM probes (3 ea.)	
080-0510	<p>SThM for NX</p> <ul style="list-style-type: none">▪ Scanning Thermal Microscopy▪ Measures thermal properties of sample surface▪ Includes the SThM module, software, test sample and manual▪ Includes pre-mounted Nano Thermal Probe cantilevers for the SThM (5 ea.) <p>SmartLitho</p> <ul style="list-style-type: none">▪ Software package for nanolithography and nanomanipulation modes▪ Includes SmartLitho software and manual<ul style="list-style-type: none">- SmartScan embedded Litho. mode for nanolithography and nanomanipulation- SmartLitho Designer software for offline drawing editor▪ Includes test samples, pre-mounted conductive cantilevers (3 ea.) and pre-mounted cantilevers with high force constant (3 ea.)	
NX Modes Accessories		con chip per montare punte compatibili
080-0205	<p><i>EFM Starter Kit</i></p> <ul style="list-style-type: none">▪ Starter kit for Enhanced Electrostatic Force Microscopy on NX-series AFM▪ Includes test samples▪ Includes pre-mounted cantilevers for EFM (6 ea.)	si
080-1701	<p><i>FMM Starter Kit</i></p> <ul style="list-style-type: none">▪ Starter kit for Force Modulation Microscopy▪ Includes a test sample for FMM▪ Includes pre-mounted cantilevers for FMM (3 ea.)	si 6
080-0100	<p>MFM Starter Kit</p> <ul style="list-style-type: none">▪ Starter kit for Magnetic Force Microscopy▪ Includes a cantilever-tip magnetizer, non-magnetic sample holder, and a test sample for MFM▪ Includes pre-mounted magnetically coated cantilevers for MFM (3 ea.)	



080-1030

Nanomechanical Starter Kit

- Starter kit for PinPoint™ Nanomechanical mode
- Includes 3 types of pre-mounted cantilevers (3 ea. each)
- Includes test sample and manual for nanomechanical property check and basic operation

si 6

080-1900

Nanoindentation Starter Kit

- Starter kit for Nanoindentation
- Includes test samples and pre-mounted Nanoindentation cantilever (1 ea.)
- Spring constant: 350 N/m (nominal value)

si 3

080-0615

High Voltage Tool Kit for NX

- Tool kit to apply high voltage for Nanolithography, EFM, and Conductive AFM (Internal, VECA, ULCA)
- Applies high voltage bias to a tip or sample by mixing DC and AC signals
 - DC bias range: ± 300 V (external), ± 10 V (internal)
 - AC bias range: ± 10 V
- Includes external bias module for tip and sample bias
- Includes an insulated sample holder to apply high voltage above ± 10 V to the tip and sample
- Provides electrical contacts to the tip and/or the sample

- **NOTE:** One of the High-voltage amplifier (080-0970, 080-0971) is needed for software controlled amplification above ± 10 V
- **NOTE:** Non-contact mode imaging is not possible with the High Voltage Tool Kit connection
- **NOTE:** Using high voltage requires extreme care from the customer.

080-0970

High-Voltage Amplifier

- High voltage amplifier for Nanolithography or other electrical measurements requiring higher bias voltage
- Provides high voltage bias up to ± 175 V (20x amplification ratio)
- Includes a high-voltage amplifier and its DC power supply
- Bandwidth: DC to 13 kHz at full-power
- Output noise: < 4 mV rms

080-0971

Low-Noise High-Voltage Amplifier



- High voltage amplifier with minimal electric noise for Nanolithography or other electrical measurements requiring higher bias voltage
- Provides high voltage bias up to ± 150 V (20x amplification ratio)
- Includes a high voltage amplifier
- Bandwidth: DC to 100 kHz at full-power
- Low output noise: < 300 μ V rms
- **NOTE:** Only 230 V (AC) can be used for the main power supply.

Liquid Cell Options

080-2910

Liquid Probehead for NX Standard Head

- For AFM imaging in liquid environment
- Allows closed-cell environment when used with Universal Liquid Cell (080-1395)
- Made of PEEK for chemical resistance
- pH range: 5 to 9
- Compatible with biological samples
- Includes pre-mounted cantilevers (3 ea.)
- Compatible with Open Liquid Cell (080-1202), EC Cell (080-1355), Universal Liquid Cell (080-1395)

si

080-2920

Liquid Probehead for NX Long Travel Head

- For AFM imaging in liquid environment
- Made of PEEK for chemical resistance
- pH range: 5 to 9
- Compatible with biological samples
- Includes pre-mounted cantilevers (3 ea.)
- Compatible with Open Liquid Cell (080-1202)

si

080-1202

Open Liquid Cell for NX

- Top open design liquid holding vessel
- Made of PCTFE for chemical resistance
- Clip-holder to fix samples
- **REQUIRES** Liquid Probehead for NX (080-2910) option for AFM measurement.

si

080-1395

Universal Liquid Cell with Heating and Cooling stage for NX



- Can be used as an open/closed liquid cell with liquid/gas perfusion and sample temperature control
- Provides sample heating and cooling using Peltier
 - Temperature range: 4 °C - 70 °C (in liquid), 0 °C - 110 °C (in air)
- Inlet and Outlet for fluid or gas exchange
- Liquid volume: 1000 µl
- Sample size: max diameter = 15 mm
- Sample thickness: up to 1.5 mm
- Sample mounting either by metal disk or by cover slip, diameter = 25 mm
- **REQUIRES** Liquid Proband for NX (080-2910) option for AFM measurement
- **NOTE:** Requires Temperature Controller II (380-0060) for heating and temperature control
- **NOTE:** Requires Coolant Circulation Kit for ULC (080-1313) for cooling below ambient temperature.

380-0060

Temperature Controller II

- Temperature controller for Universal Liquid Cell (080-1395)
- Includes sensor converter
- Part Number: LDT-5948

080-1313

Coolant Circulation Kit for ULC

- Circulates coolant used in Universal Liquid Cell (080-1395)
- Includes a circulation pump and reservoir

Electrochemistry (EC) Cell Options

080-1355

Electrochemistry (EC) Cell for NX

si

andrà riconsiderato



- A liquid vessel with four electrodes mounting position for liquid and one connector to the bottom of the sample
- Includes AgCl, Pt-Ir electrodes
- Made of PCTFE for chemical resistance
- Includes EC Chip Carriers (700-0953, 10 ea.)
- Sample size: 8.8 x 8.8 mm to 16.4 x 18.4 mm, up to 2.2 mm thickness
- Includes pre-mounted non-conductive cantilevers (3 ea.)
- Includes EC-AFM sample (1 ea.)
 - Au coated mica substrate
 - Dimension: 10 x 10 mm, 150 nm thickness of Au coating
- **REQUIRES** Liquid Proband for NX (080-2910, 080-2920) option for AFM measurement
- **REQUIRES** Potentiostat/Galvanostats (780-1001, 780-1002) or any Potentiostat/Galvanostat provided by users
- **REQUIRES** Additional probes appropriate for customer measurement.

la old va benissimo

080-1396

Electrochemistry Tool Kit for Universal Liquid Cell

- Includes electrode mounting positions for liquid and a connector to the bottom of a sample
- Includes AgCl, Pt-Ir electrodes
- Includes EC Chip Carriers (700-0953, 10 ea.)
- Includes pre-mounted non-conductive cantilevers (3 ea.)
- Includes EC-AFM sample (1 ea.)
 - Au coated mica substrate
 - Dimension: 10 x 10 mm, 150 nm thickness of Au coating
- **REQUIRES** Universal Liquid Cell (080-1395)
- **REQUIRES** Potentiostat/Galvanostat (780-1001, 780-1002) or any potentiostat/Galvanostat provided by users
- **REQUIRES** Additional probes appropriate for customer measurement.

Customized System & Software Options

080-1802

Signal Access Module for NX

- Provides convenient access to analog input and output signals of the AFM instrument
- Signals can be individually switched from normal operation to user input