SPIN Equipments - Structural, morphological and chemical properties

Structural, morphological and chemical properties					
	Name	**Picture**	**Description**	**Site**	**Responsible**
1	theta-2theta diffractometer for thin films analysis		3 circle- diffractometer. Devoted to thin films (theta-2theta, ?-scan, phi-scan) and powders characterization.	NA	Aruta
2	AFM - XE100 PARK		Atomic force microscope, in ambient air, integrated with a motorized optic stage, closed-loop xy scanner (scan range 50*50 ?m2), z-scan range 12 ?m. Operation modes: contact AFM, interval contact AFM, non-contact AFM, lateral force microscopy, electrostatic force microscopy, scanning Kelvin force microscopy.	NA	Salluzzo
3	AFM/MFM in ambient air		Setup devoted to Atomic Force Microscopy and Magnetic Force Microscopy in ambient air.	NA	Ausanio
4	Cryogenic Scanning Tunnel Microscope (STM)	Assembled prototype	Prototypal Scanning Tunneling Microscope, provided with: cryogenic setup for low temperature measurements down to 1.5 K; 5T superconducting magnet, with bias supply; current/voltage high gain, low noise amplifier; control electronics by RHK, lock-in amplifier; software. Maximum scan area: 1.5 micron x 1.5 micron at room temperature	NA	Di Capua

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5	Atomic absorption spectro-photometer		Several lamps devoted to atomic absorption analyses of various metal elements in dilute water solution are available. No PC interface available.	GE	Vignolo
6	Metallographic microscope		Inverted geometry microscope working with bright field, dark field and polarized illumination, with a magnification in the range of 20 X to 2000 X. The microscope is connected to a PC for the acquisition of the pictures in JPG format.	GE	Bernini
7	Stereoscopic microscope		Stereo Microscope for low magnification observation (from 6.3x to 50x) using incident light illumination, connected to a PC for the acquisition of the pictures in JPG format. .	GE	Bernini
8	Sputter coater for SEM preparation		Digitally controlled sputter coater, ideally suited for SEM, equipped with two heads for gold and carbon coatings.	GE	Bernini
9	Scanning electron microscope with EDS microanalysis		Scanning Electron Microscope with Secondary Electron detector, Backscattered Electron detector and with an Energy Dispersive X-ray analysis detector for elemental composition analysis.	GE	Bernini

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10	theta-2theta diffractometer for thin films and powders		Bragg Brentano diffractometer for powders and thin films. The theta angle movement is independent from 2theta. The setup allows low angle measurements so that it can be used for thin films thickness measurements (range 10-100nm). It mounts 1°,1/2°, 1/4°,1/30° slits on the incident beam. 1°,1/2°, 1/4° slits, Ni filter and graphite monochromator are on the diffracted beam side.	GE	Bellingeri
11	4-circles diffractometer	Assembled 	4-circle (theta, omega, phi and chi) automatic diffractometer equipped with quartz monochromator on the diffracted beam (presently to be substituted by a Ni/C parabolic monochromator on the incident beam). The setup allows phase analysis (theta-2theta) and preferential orientation (rocking curve, phi scan, polar maps reciprocal lattice maps) measurements. Equipped with steady or oscillating bulk-sample holder and goniometric head for thin films and single crystals, with telescopic laser alignment.	GE	Bellingeri

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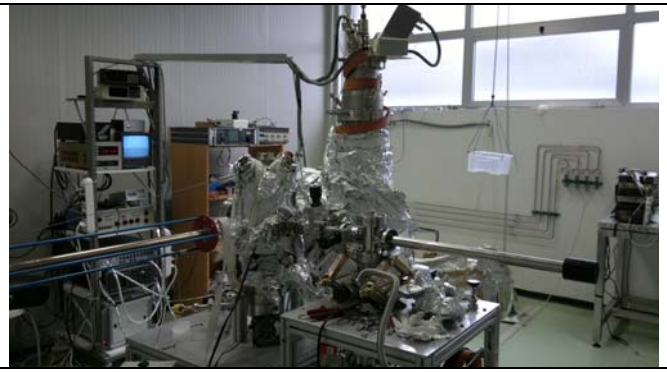
12	AFM		AFM with 50um x 50um or 5um x 5um maximum scanning-sample capabilities. It is equipped with an optical microscope with lateral resolution of 5um. It operates under ambient conditions or within a liquid cell - with temperatures up to 150°C - in standard contact mode and dynamic modes. Control unit allows to acquire 2 simultaneous maps. STM, Kelvin, conductive, capacitive and force-volume modes are readily available. AFM can also be used for constant-current electrochemical nanolithography.	GE	Buzio
12 bis	STM		STM for the morphological and spectroscopic characterization of conductive samples under UHV at ambient temperature and cryogenic temperatures (80K – 140K and 5K-65K). Tunnelling current varies in the range 5pA -300nA. Scanning area is 10 um x 10um x 1um at room temperature and 1.8um x 1.8um x 0.2um at 5K. A tailored samples holder allows to perform in situ 4-wires transport measurements on the studied specimens.	GE	Buzio

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13	AFM/STM MN5		AFM/STM MN5 works in the following modes: - Contact AFM microscopy. - AFM tapping mode microscopy. - piezo-sensitive AFM maps. - AFM conductance surface maps (I-V), - Kelvin Probe microscopy. - Torsion mode (extending the tapping mode). - Force spectroscopy. - Scanning Tunneling Microscopy. The AFM/STM MN5 setup provides material characterization by local resistance, surface electrostatic potential, charging, piezoelectric measurements. It supports thin film fabrication both by topographic characterization and by profiling the nanostructures that are fabricated by nano-etching.	SA	Bobba
14	XRD SA		This instrument allows to perform x ray scans in the "2theta-omega" mode in the range between 5 and 120 degrees. It is suitable for routine measurements of policrystalline, thin films and crystallographically orientated samples.	SA	Vecchione
15	SEM SA		The electron microscopy facility is constituted by a tungsten/LaB6 scanning electron microscope (SEM) (LEO EVO 50) with a secondary electron detector for surface imaging and a 4-quadrant back-scatter electron detector for density imaging detector. The analytical instrumentation is comprised of an Oxford Instruments INCA ENERGY (EDX) x-ray analysis system, INCA WAVE (WDX) wavelength dispersive x-ray spectrometer and INCA CRYSTAL (EBSD) electron back-scatter diffraction.	SA	Vecchione

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16	HRXRD SA			The high resolution x-ray diffractometer (Pananalytic X'Pert MRD PRO) is a highly advanced, versatile materials characterization system. Interchangeable PreFIX incident and diffracted beam optics can be configured for optimal measurement of high resolution scans and reflectivity experiments. By combining incident (with graded parabolic x-ray mirror and four-bounce Ge(220) monochromator) and diffracted (with triple axis setup using a three bounce (022) channel cut Ge crystal) beam optics, high resolution configuration can be applied to highly ordered crystals and epitaxial thin films.	SA	Vecchione

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17	AFM/STM RT		AFM/STM RT operates in Ultra High Vacuum in the following modes: - AFM contact mode microscopy, - AFM non-contact mode microscopy, - Scanning Tunneling Microscopy (STM), - Magnetic Force Microscopy (MFM) - Electrostatic Force Microscopy (EFM) - Field Effect Microscopy The AFM/STM RT setup is a powerful scanning microscope which operates in the field of magnetic characterization of materials and in the field of tunneling microscopy and spectroscopy. It reaches the atomic resolution along the three axes x,y, e z. It is of help in the topographic characterization of thin films surfaces and nanostructures.	SA	Bobba
18	SFM Cryo		SFM Cryo operates in Ultra High Vacuum, in a temperature range between 5K and 300K, in magnetic fields up to 7T, in the following modes: - Low temperature Tunnel Spectroscopy. - AFM contact mode microscopy, - AFM non-contact mode microscopy, - Scanning Tunneling Microscopy (STM), - Magnetic Force Microscopy (MFM) - Electrostatic Force Microscopy (EFM) SFM Cryo is mainly devoted to investigation of superconducting and magnetic materials and heterostructures. SFM Cryo allows electric transport measurements. It also allows generating activation or control electric-signals that are applied to the sample during (and joint to) microscopy.	SA	Bobba

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19	TG-DTA		The TG-DTA setup (Thermo-Gravimetric and Differential Thermo-Gravimetric Analysis) allows the contemporary measurement of reaction and phase transition temperature measurements (DTA); and of weight variations (TGA) as a function of temperature. The model is Setsys Evolution 1750. It has a working range between room temperature and 1750°C. It operates in gas flux (O2, Air, N2, Ar, He atmosphere). The analysis of emitted gases is performed by a Pfeiffer Omnistar mass spectrometer.	SA	Gombos
20	DSC		The DSC instrument (Scanning Differential Calorimetric Analyzer) determines the specific heat variations that are associated to phase transitions. The model is Perkin-Elmer Pyris Diamond DSC. It is cooled by a liquid nitrogen Cryocooler. In a working range 190°C a 200°C.	SA	Gombos
21	Polarized Light Optical Mycroscope		Optic microscope with stereoscopic ocular (KWF10X) and simultaneous image capture by CCD camera (Euromex VC3031). It has four different optics with various magnification (between 5x and 40x). It has an internal light source and polarizer filters that allows to investigate local differences in the crystallographic orientation of samples.	SA	Gombos
22	X Ray Diffractometer		The diffractometer is optimized for thin film characterization. It allows to investigate the epitaxy of films as a function of substrate choice and to determine its strain by reciprocal space mapping.	Rome	Tebano