

Nuclear Magnetic Resonance (NMR)



NMR is one of the most powerful spectroscopic techniques currently available for the determination of the chemical structure and composition of organic, inorganic and polymeric materials. NMR is a direct method for obtaining unambiguous detailed information about a system without the need of a standard for comparison. The facility has capabilities for structure determination of unknown substances, as

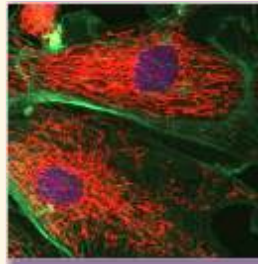
well as for chemical and physical characterization of mixtures.

The NMR facility includes a Bruker Avance AV-500 with multinuclear, variable temperatures and solids (Cross Polarization Magic Angle Spinning) capability and spectrum resolution and sensitivity.

Confocal Imaging Facility

Day after day confocal microscopy is proving itself as a flexible solution to many problems in biological research, material testing, and quality assurance. Using Confocal or two photon microscopy you are able to acquire images with very high resolution and contrast, providing non-contact quantitative 3D analysis of microstructures.

The most common applications of our facility include: 3D reconstruction organelle structure and function, probe rationing, conjugated antibodies, DNA and RNA measurements, FRAP (florescence recovery after photobleaching), raw material surface imaging, quantitative and qualitative analysis of samples among others.



The Confocal Microscopy Facility is equipped with a Zeiss LSM 510 confocal scan head which can be used with either a inverted microscope or a upright microscope. Confocal images can be acquired using Argon laser at several wavelenth (458 to 633nm).

Functional Genomics Research Center (FGRC)



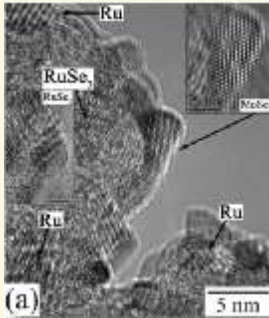
different DNA. Research services and products for the study of gene expression and function within a variety of living systems relevant to biomedical or basic sciences. Workshops for the different techniques are also available.

DNA microarrays are high-throughput biological essays to get information on gene expression in different types of cells. These studies help in the identification of cancer tumors, responses of bacterial infections and comparison of the



Nanoscopy Facility

The Nanoscopy Facility provides to researchers and other scientists a study of: composite nanocatalysts, multilayer arrays, nanorod shape heterostructures, core/shell nanoparticles, nanorods/contacts interfaces, and distribution of surface passivating elements in nanosensors arrays and nanostructures in general.



The instruments include: a state-of-the-art ultra high resolution(HR) Cs probe corrected TEM (JEOL JEM-2200FS), a HR TEM (JEOL JEM-2100F), a conventional energy filtered TEM (Zeiss LEO 922), a HR field emission SEM (JEOL JSM-7500F), and a focused ion beam system (JEOL JEM-9310).



Sequencing and Genotyping Facility (SGF)

SGF provides novel equipment and technology for running sequencing, genotyping and fragment analysis applications. Full service includes all sample prep-processing procedures, general oligonucleotides for sequencing such as T7, SP6 and M13 primers, among other services. The facility includes the following key equipment, 1) ABI 3130xl Genetic Analyzer, 2) GS FLX Titanium System (454), and other equipment for general use, like 1) Stratagene qPCR system, 2) Plate and Refrigerated Centrifuges, and 3) NanoDrop Spectrophotometer.



Applications

Our highly trained personnel and facilities assure the best available service for:

Pharma & Biopharmaceutical, Medical Device and Food sectors

- Identification of Foreign Materials
- Novel Method Development & Validation
- Determination of the elemental composition
- Identification of polymorphism in pharmaceutical solids
- Characterization of Out-of-Specification (OOS)
- Assays Test (unexpected HPLC peaks)
- Characterization of gases and odors
- Characterization of the surface of materials
- Characterization of raw materials
- Particle Size analyses

Bioscience and Biotechnology

- Polynucleotide (DNA & RNA) sequencing
- Characterization of gene expression using DNA microarray assays
- Protein Characterization by Microscopy and Spectroscopy techniques
- Carbohydrate and Polysaccharides Characterization by Microscopy and Spectroscopy techniques
- Mass spectrometry (MS) for protein, polynucleotide, polymers, hormone and other biomolecules

Other scientific and research service upon request



**Materials
Characterization
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The Organization

The Materials Characterization Center (MCC) is an innovative industry-academia resource with demonstrated capacity to provide advanced applied research analytical services to demanding high technology industry and manufacturing sector. The MCC was created in 1995 by the Faculty of Natural Sciences of University of Puerto Rico (UPR) in consortium with INDUNIV, with support from the government of Puerto Rico in the form of a grant from the Science and Technology Fund, administered by Puerto Rico industrial and economic development agency (PRIDCO). The Center's scientific staff has several PhDs, masters and bachelor degrees in Chemistry, Physics and Biology within our personnel.

MCC's industrial Partners and users represent a wide spectrum of leading companies in the pharmaceutical, chemicals plants, biopharmaceutical, medical device, food and other industries, as well as government agencies concerned with forensic and regulatory affairs. Other services that MCC provides besides the industrial sector is to the academia, engaged in scientific research. MCC offers direct support, scientific advice and testing to the research projects undergoing and under strict confidentiality criteria.

Analyses of the samples are conducted by MCC's scientists and technicians, but clients own technicians may participate in the analytical process. This offers greater flexibility in responding to unexpected findings and rising during the analyses and allows expanding the process while on the job, potentially saving time and expense to the industrial partner or user.

Operating Policies

Located within the Rio Piedras Campus of the University of Puerto Rico, the Materials Characterization Center, Inc. operates as a private business, administratively independent from the university and not limited by the institution's personnel or administrative policies.

By virtue of its location within the Natural Science Faculty, the MCC has access to the Faculty's technical and instrumentation capabilities and to the infrastructure of the new Molecular Science Building (MSB); but we maintain the ability to work by its own. We can complement its capabilities in order to offer a wider range of services using state-of-the-art research technologies. Our different analysis techniques provides the client as well the technicians powerful keys to characterize or identify most of the materials that can cause a disrupt in the industry, community or academic sector.

MCC provides quality systems to ensure that each service meets your goals. We follow cGMP's as well as QA Agreements. GMP's also are followed by our SOP's in order to maintain the quality of each analysis performed. Audits are performed in house and by the principal industries and are part of MCC's policies in order to maintain our excellent services. Our quality and excellence service has been demonstrated by clients among the years trusting in our work.

Center's Division:

The Materials Characterization Center, Inc. (MCC) is the only facility within 1,000 miles to offer highly specialized analytical services and the corresponding scientific expertise under one roof.

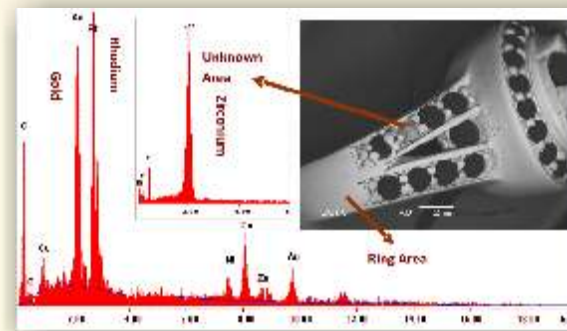


Surface Microscopy & Spectroscopy (SMS)

Understanding the surface chemistry and morphology of materials is a very important aspect of science and technology. In recent years the fields of material science, biology, electronics and pharmaceuticals, among others, have experienced an impressive increase in the use of surface techniques. For example, particle size and porosity, which are particularly important in the pharmaceutical industry for the characterization of excipients and final formulations, are determined with surface science techniques. In the field of microelectronics, both morphology and chemical composition are determined in the nanometer and micrometer range, respectively.

The surface spectroscopy equipment includes: a Physical Electronics PHI 660 Scanning Auger Microprobe (SAM), PHI 5600ci X-Ray Photoelectron (XPS or ESCA) / Secondary Ion Mass (SIMS) / Ion Scattering (ISS) Spectrometers, Bruker Tensor and a Thermo Nicolet Nexus FT-IR / Continuum IR Microscope.

The surface microscopy equipment includes: JEOL LV Scanning Electron Microscopes (SEM) with low vacuum and X-Ray fluorescence (EDAX) capabilities; a Digital Instrument Nanoscope IIIA Atomic Force (AFM) and Scanning Tunneling (STM) Microscopes, and an Nikon E400 POL. In addition, Jeol LV.



Mass Spectrometry & Chromatography



With the development of multiple modes of sample introduction and ionization almost any type of material can be analyzed by mass spectrometry (MS). These can range from simple gases to complex high molecular weight polymers and biomolecules. Mass spectrometry has become the method of choice for the identification of chemical compounds, biologic materials and even for the sequencing of polypeptides.

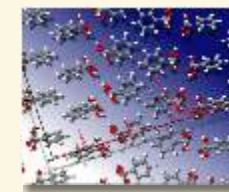
The facility has the capability for running a broad range of applications. These are GC/MS, HPLC/MS, analyses of volatile organic compounds by headspace, direct insertion probe, direct injection, as well as analysis of polymers or protein materials.

The facility includes: Bruker Benchtop Scion TQ GC-MS-MS, HPLC/K2 MS interphase/EI-MS, Director Insection probe, Hewlett Packard Benchtop GC-MS, Waters Micro Q-TOF with Electrospray and APCI interphases, HPLC/UV/Vis and GC-FID.



X-Ray Diffraction (XRD)

X-Ray diffraction is a very powerful tool used for the non-destructive characterization of materials and in particular of industrial solids. Essentially, the technique involves the acquisition of a pattern of reflected x-rays from a sample. This pattern arises due to the crystallographic arrangement assumed by atoms constituting the solid being examined. Consequently, the crystal structure and orientation of the solid material can be readily established. This information can be used to establish the existence of undesired polymorphic forms which can change the physical properties of an industrial solid, such as solubility, hardness, bioactivity and friability.



Available techniques includes: powder diffractometry for compound identification, reflectometry for multilayered thin film structure characterization and stress/strain determination and texture studies.

The facility is equipped with a D5000 diffraction system.

We focus on quality and speedy turn around times tailored for the demanding industrial deadlines.