

Advanced Materials and Solids Analysis Research Core (AMSARC)

Providing EPA researchers and collaborators with the latest technology

What is AMSARC?

The Advanced Materials and Solids Analysis Research Core (AMSARC), centered at the U.S. Environmental Protection Agency's (EPA) Andrew W. Breidenbach Environmental Research Center in Cincinnati, Ohio, is the foundation for the Agency's solids and surfaces analysis capabilities. The state-of-the-art analytical equipment that comprises AMSARC will benefit researchers in all of EPA's laboratories in Cincinnati, as well as other EPA research centers across the nation. It is expected that AMSARC will establish a stimulating and collegial environment for conducting cutting edge research that will benefit continued progress toward global sustainability, materials management, pollution prevention, and public health.

Mission

Cutting-edge research tools offer great flexibility and breadth to EPA's research. AMSARC technology supports various EPA projects, including water quality research, corrosion control, green chemistry, bacteria and nanomaterials characterization, arsenic removal from drinking water, and many others. The mission of AMSARC is to support EPA's materials science and

engineering-related research activities while fostering multidisciplinary research collaborations. AMSARC will assist EPA's scientists and engineers to develop innovative solids analysis and preparation techniques and maintain proficiency with state-of-the-art practice techniques.

Collaboration and Use

Because AMSARC is not a standalone entity, staff will not be specifically associated with it. AMSARC users include principle investigators and analysts that use or rely on the instruments to complete their research. Specifically, EPA research staff in Cincinnati, including engineers, chemists, and technicians, make-up the workforce tied to activities within AMSARC. Contract staff, students, and postdoctoral researchers also constitute AMSARC users.

Beyond research on specific projects, some staff members also have the responsibility of being a contact person for one or more AMSARC instruments. That is, they have been identified as an expert on a specific instrument. As an expert, they may also provide training to other users, approve skills of potential instrument users before they independently use the



instrument, and offer technical assistance to others.

In all aspects of our work, from problem identification and research design, and through to implementation, we must involve the widest span of disciplines to bring different perspectives to the table. Research planning involves extensive outreach to stakeholders to obtain input, and collaboration with EPA's program offices, which establish standards to protect public health and the environment, and the Agency's regional offices, which support and enforce the implementation of regulations.

Instruments Available for Use

AMSARC's analytical instruments, listed below, are available for routine sample analysis and major research activities. AMSARC also houses a suite of preparatory instruments including balances, polishers, presses, desiccators, vacuum carbon coating systems, shakers, ovens, and numerous others.

Instrument	Use
Atomic Force Microscope	Provides high-resolution surface profilometry; analyzes pit corrosion; studies nano-scale forces; determines conductivity of a surface
Carbon-Sulfur Analyzer Model CS230	Measures the total carbon (organic and inorganic) and the total sulfur on solid samples; provides a quality control internal consistency check with XRF
Coulometric Carbon Analyzer Model: CM5012 Coulometer	Measures the total inorganic carbon in solids and aqueous samples
Confocal Microscope Model: Zeiss 710	Microscopy technique used to increase optical resolution and contrast of a micrograph by using a scanning laser point illumination and a spatial pinhole to eliminate out-of-focus light
Stereo & Fluorescent Microscopes Model: Zeiss discovery	General microscopy equipment for stereo imaging and fluorescent microscopy
Field Emission Scanning Electron Microscope	High resolution (1nm resolution) SEM with energy dispersive spectroscopy
Keyence Microscope	Digital microscope with magnification to 20x to 200x
Micromeritics Solids Analyzer	Determines physical characteristics of solid materials including BET surface area, metal dispersion, and active metal surface area
Mössbauer Spectrometer	Atomic level identification of iron (Fe) speciation and mineralogy
Nuclear Magnetic Resonance Spectrometer	Measures elemental compositions in solid samples including the oxidation states of the elements
Petrographic Microscope Model: Labophot-pol 144942	Mineralogical identification of solids
Powder X-Ray Diffractometer Model: X'Pert Pro	Mineralogical identification of solids
Scanning Electron Microscope with Wavelength & Energy Dispersive Spectroscopy Model: JSM-6490LV	Performs structural and elemental analysis of material and biological solids as well as 2-dimensional elemental mapping
Scanning Transmission Electron Microscope (STEM)	Used to study nano-sized ultra-structure of material and biological samples by transmitting an electron beam through the sample
X-Ray Diffractometer	Spectroscopic technique for identifying minerals and crystal structure
X-Ray Fluorescence (XRF) Model: Axios Advanced PW4400	Quantitative elemental analysis of a sample; can also be used for qualitative analysis
Zeta Sizer Model: 3000HSa DTS 5301	Determines the charge of one ion in the sample; investigates how ions will attract or repel other ions average zeta potential; calculates zeta potential and electrophoretic mobility



The Advanced Materials and Solids Analysis Research Core (AMSARC) is an informally recognized collection of materials and surface analysis equipment, and the associated risk management research of EPA engineers and scientists. AMSARC supports the Agency's aim of providing researchers with the technologies they need to ensure the safety and protection of public drinking water, land, and air.

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Additional Information:

<http://www.epa.gov/nrmrl/amsarc/>

