
Applied
Research
Center

CONSORTIUM CAPABILITIES

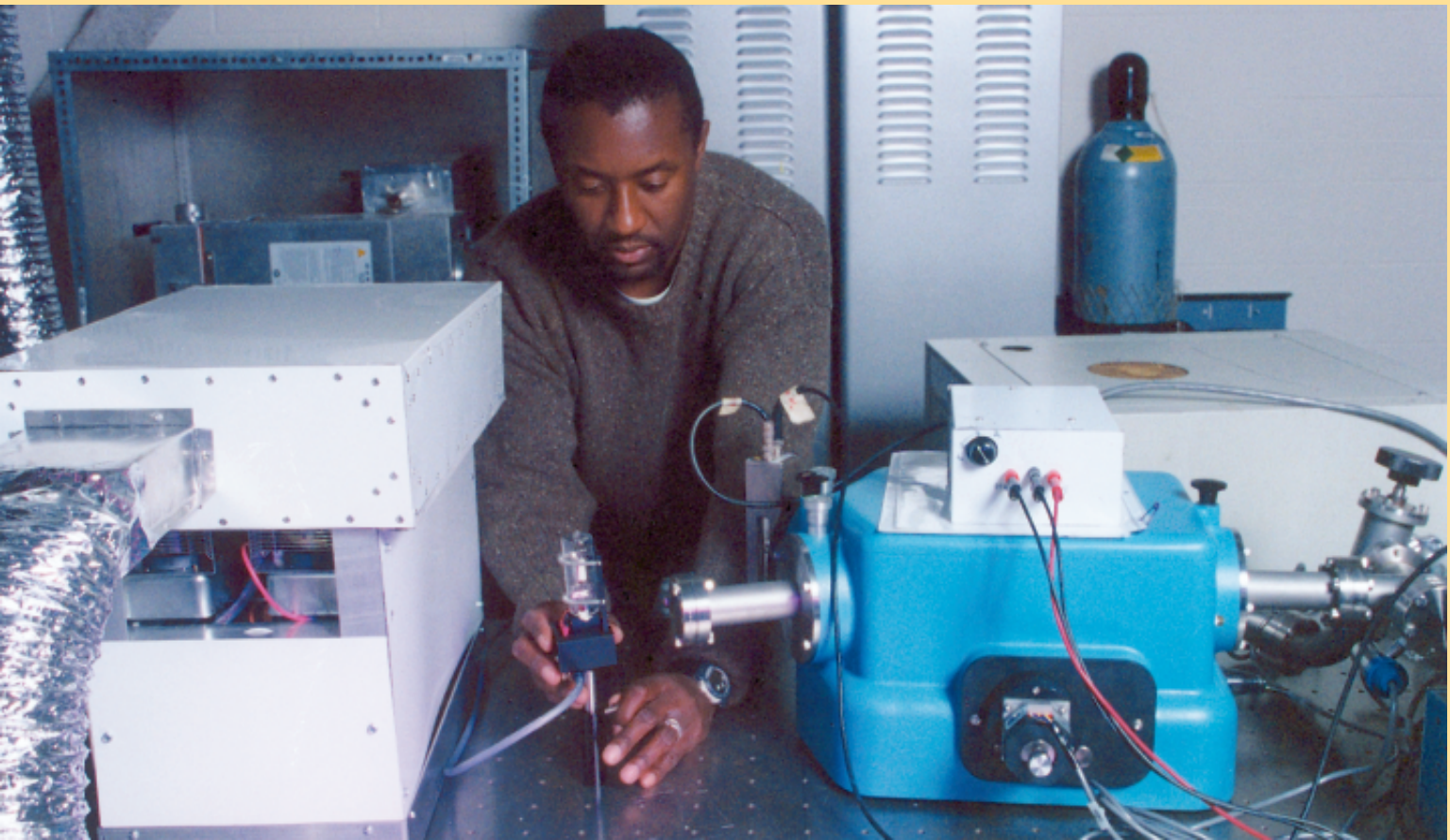
The driver in advanced materials development is to create products with competitive advantages. Products must continuously become faster, lighter and cheaper and must provide additional function to maintain their market share. The ARC, offers a strong competitive advantage to both small and large businesses by giving our customers one-stop access to multidisciplinary expertise and equipment, business services, and the intellectual infrastructure of several universities and a federal lab. Through the ARC, even a one-person business can deploy advanced materials processing methods and tools including access to the world's most powerful tunable laser. Areas of particular expertise include:

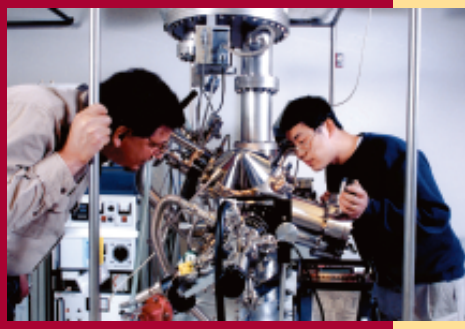
MATERIALS PROCESSING WITH LIGHT, PLASMAS AND OTHER SOURCES OF ENERGY

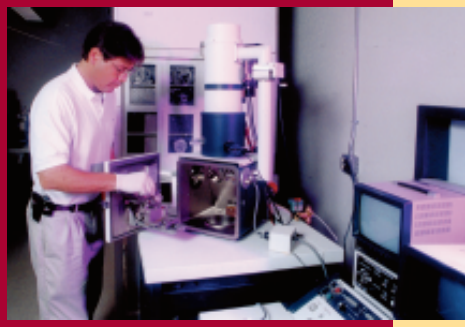
At the ARC various processing technologies are used to create materials, structures, and devices that play an increasingly important role in high value-added manufacturing of computer and communications equipment, physical and chemical sensors, biomedical instruments and treatments, semiconductors, thin films, photovoltaics, electronic components and optical components.

For example, making coatings, including paint, chrome, nickel or gold-plating using light or plasma processing is more environmentally friendly than traditional thermal methods such as melting, baking, stamping, and forging. Ion implantation, a "dip like" method, can replace anodizing and is useful for making aircraft and automotive parts, forming semiconductor chips in computers, sensors, and memory, with almost no waste to dispose of or reclaim.

High-powered lasers and discharge lamps can process materials with more efficiency and cleanliness. All of the expertise necessary to incorporate lasers into production for use in cutting, drilling, welding and engraving is available at the ARC. New very high-power, tunable lamp-based systems are being developed for next generation photolithography, water and air treatment, and surface cleaning.







MATERIALS CHARACTERIZATION & SURFACE ANALYSIS

After a coating is created or modified, several extremely sensitive forms of microscopy can be used to measure and understand its properties. There are also a variety of methods to determine how the material has changed. Hidden defects can be identified in devices using extremely powerful non-contact, non-invasive, or non-destructive methods at the atomic and nano-scale. These methods can provide quality assurance during manufacturing, especially on high-speed production lines where components or materials are moving too quickly for traditional sampling methods.

We can apply a variety of ultrasonic, radiographic, thermographic, electromagnetic and optical methods to probe materials, tissues and structures by non-invasive means. These techniques, originally developed for nondestructive evaluation of structures and materials in the aerospace industry, can now be used for medical applications where there is a need to achieve greater sensitivity, speed, and the ability to examine structures smaller than a grain of salt.

SENSORS & ELECTRONIC EQUIPMENT

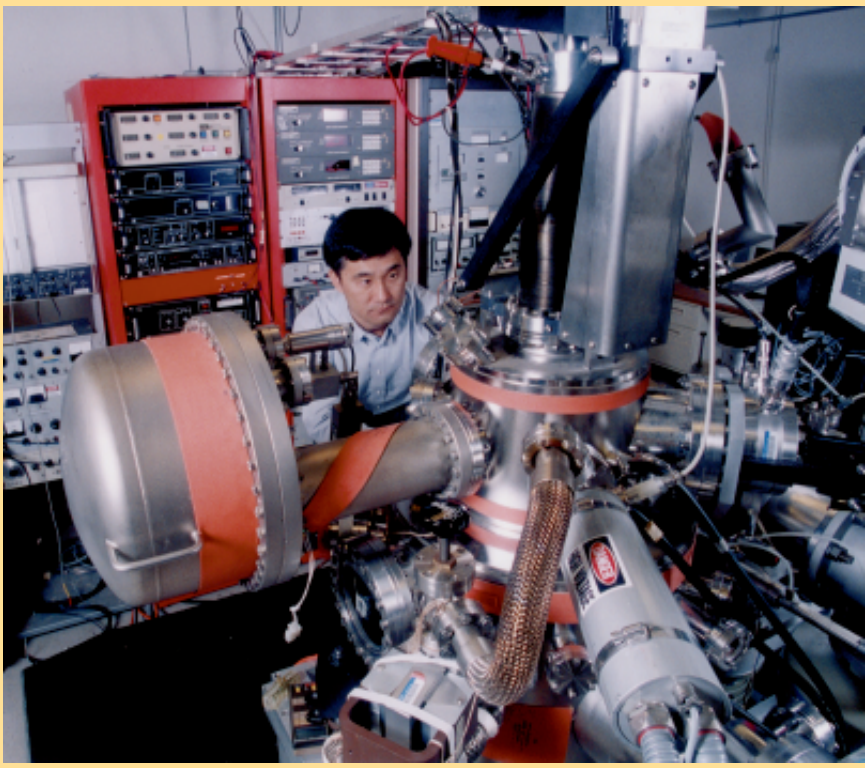
The Advanced Circuits lab at the ARC offers the ability to quickly prototype and test an integrated circuit board to your specifications. The design lab adjoins a solid-state sensors and materials lab used during the development phase and to characterize the resulting ASIC circuits. In the Laser and Photonics lab, researchers are developing laser-based instruments for making precision measurements and measuring the optical properties of new materials.

THIN FILMS & OPTICAL MATERIALS

A particular strength of the ARC Consortium is the areas of thin films and optical materials. Research on plasma-surface interactions, surface cleaning, passivation and modification, have lead to the development of new less toxic coatings & coating techniques for improved thermal transport, and durability of electronic materials. Companies having thin film coatings problems or needing to analyze a particular coating can find such service in the ARC.

ENVIRONMENTAL TESTING & MONITORING

Understanding our environment, including society's impact on the atmosphere, coastal waterways, rivers and urban lakes is an area of great interest to many companies. The Consortium has expertise in the ecological monitoring of earth processes including the ability to analyze soil samples and water quality.

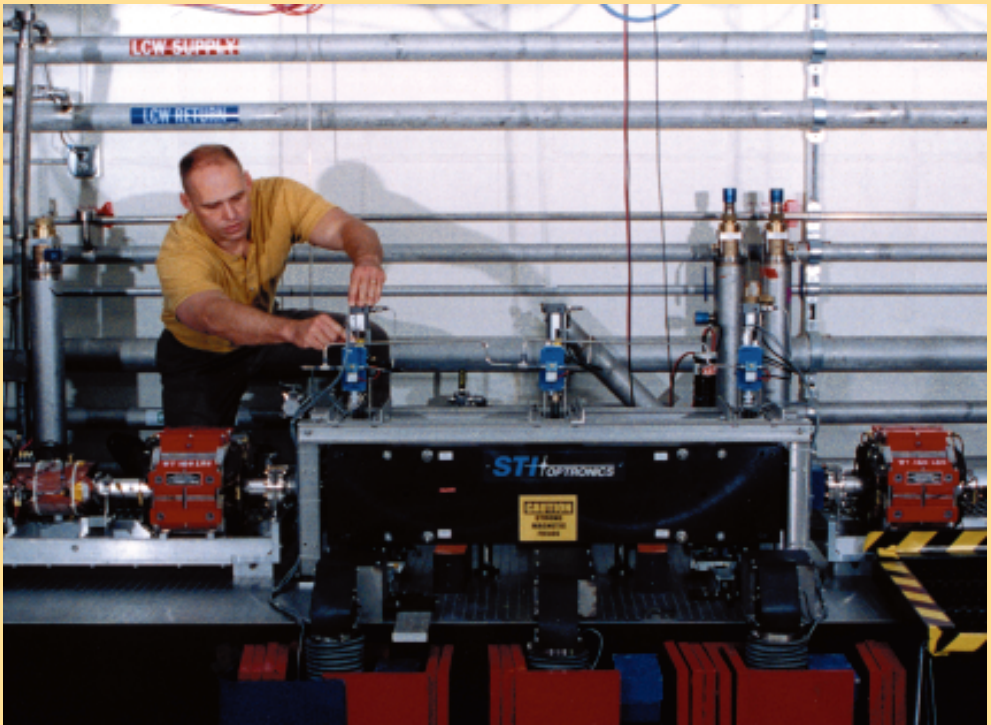


COMPUTATIONAL MODELING

Underpinning these capabilities is the ability to use computer modeling to simulate and forecast behavior of materials and devices in different manufacturing environments and processes. We can provide programming and computational modeling to companies that need the service.

JEFFERSON LAB FEL

At Jefferson Lab, a consortium of DOE/DOD/industry and universities has worked together to build the world's most powerful kilowatt class tunable infrared laser. The Free Electron Laser (FEL) offers the scientific and industrial community a unique light source for basic and applied research because of its broad tunability, high-average power and short pulse time structure. Industrial and university applications of the FEL include micromachining, polymer processing, metals processing and surface spectroscopy.



The FEL user facility is located at the far end of the Jefferson Lab research complex, about a half-mile from the ARC. The facility houses six separate laboratories where FEL experiments can be conducted. The labs are configured for flexibility and rapid changes of user test station hardware. This allows industries to bring their experiments in very quickly and to conduct those experiments right next to the laser operators and experts providing the light. Follow-on analysis of FEL experiments can be conducted either in the FEL lab or in the ARC building depending on the customer's needs. Students and university researchers are always eager to help companies conduct and analyze results.

The Applied Research Center or ARC, is the physical location for this consortium. This flagship building, constructed by the City of Newport News' Economic Development Authority, marks the start of a 200 acre research park and is a symbol of cooperation and encouragement of local and regional business development. The ARC resulted from a unique collaboration between the City of Newport News, the state, the federal government and the four consortium universities. The ARC comprises 27 state-of-the art laboratories including office space, computer facilities and a technical library, concentrating the region's multidisciplinary materials processing resources to encourage productive, stimulating interaction. Classroom courses can be taught using distance learning technologies so students and faculty can stay in the building, minimizing interruptions to their research. The ARC is also home to high-tech business start-ups, a venture capital firm, and high-tech business support services including Virginia's Center for Innovative Technology, the Hampton Roads Technology Council and the Virginia Philpott Manufacturing Extension Partnership.

A RESOURCE FOR THE REGION

Do you need to create an advanced material, to design a device, or to make your process better, faster, lighter, or cheaper? The Applied Research Center Consortium at the Applied Research Center (ARC) in Newport News, Virginia can help you. The Consortium was formed to facilitate advanced materials processing development and commercialization in Hampton Roads. This unique consortium of universities, including Christopher Newport University, the College of William and Mary, Norfolk State University, Old Dominion University and the Department of Energy's Thomas Jefferson National Accelerator Facility (Jefferson Lab) is available to help you with a wide range of industrial problems. Our Consortium's goals are: 1) to increase the quality of research and education, 2) to investigate complex problems identified by industry; and 3) to stimulate new economic growth and employment. Having the partners share specially designed lab and office space next to the Jefferson Lab's extensive support infrastructure facilitates collaborations for our industrial clients. The Commonwealth has recognized this excellent arrangement by awarding a $2 million, 5-year grant through Virginia's Center for Innovative Technology (CIT) to develop "The Center for Plasma and Photon Processing" at the ARC. ARC universities also participate in other consortia including the Virginia Microelectronics Consortium, providing rapid access statewide to other Commonwealth universities and to companies with expertise in microfabrication for electronic devices.This vast array of resources helps the consortium to collaborate with industry, to solve their problems, to create useful new materials and processes, and to educate their future employees.

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Interested in further information about our capabilities?

CONTACT THE APPLIED RESEARCH CONSORTIUM BY CALLING, EMAILING OR FAXING

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