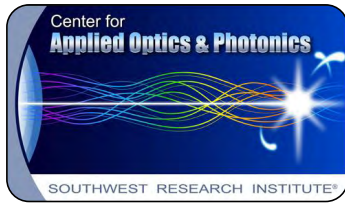


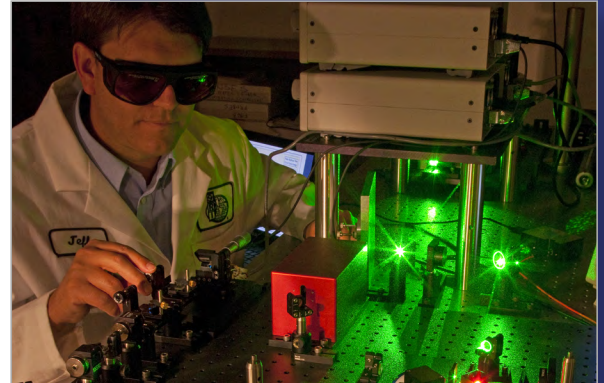
# Center for Applied Optics and Photonics



## Optical Imaging and Machine Vision

Institute scientists and engineers develop innovative optical imaging and machine vision systems for a variety of industrial and security applications, including:

- Imaging systems and hyperspectral imaging through the ultraviolet to far infrared spectral regions
- 3D imaging with multiple methods
- Biometric collection systems
- Particle distribution and sizing
- Flow visualization and analysis
- Mobile robot and manipulator perception

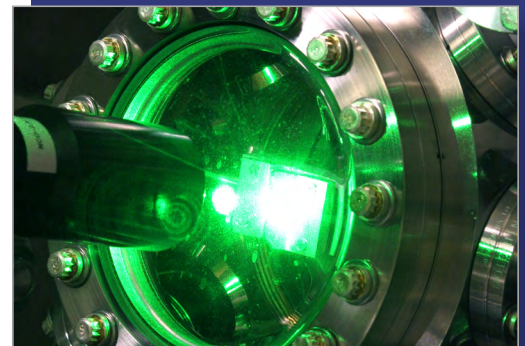


SwRI developed a dual-wavelength injection seeded pulsed Ti:sapphire laser that is immune to acoustic noise.

## Photonics, Optical Sensing and Spectroscopy

Optical systems provide a non-contact method for inspection, measurement, analysis and detection. SwRI's experience in photonics, optical sensing and spectroscopy includes:

- Metamaterials and plasmonics
- Microelectromechanical systems (MEMS)
- Spectroscopy: UV/Vis/NIR, FTIR, Raman, LIF, and LIBS
- Extreme ultraviolet and infrared sensing LIDAR applications and remote sensing
- Interferometry: laser ultrasound and metrology



SwRI scientists developed a technique called inverted surface-enhanced Raman spectroscopy to enhance sensitivity and identify trace concentrations of molecules.

Optics and photonics have become part of everyday life from cell phones to medical diagnostics to fundamental research and development. For more than 30 years, Southwest Research Institute® (SwRI®) has provided innovative solutions to problems within the field of optics and photonics for use in a wide range of industrial and security applications. SwRI has launched a collaborative multidisciplinary effort with the formation of the Center for Applied Optics and Photonics to resolve the technical challenges associated with the development and integration of optical and photonic systems for manufacturing, consumer products, metrology and scientific instrumentation.

## Capabilities

### Solid-State Lasers

SwRI scientists and engineers have extensive knowledge of solid-state laser development, integration and evaluation, including:

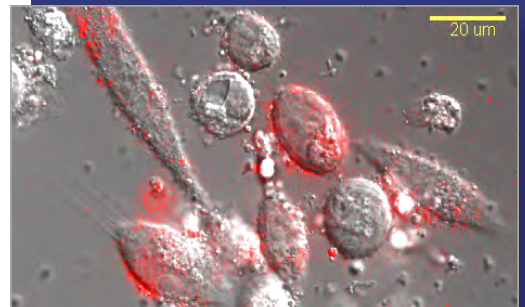
- Laser specifications and requirements
- Solid-state laser design and analysis
- Laser integration and performance measurement
- Specialized development, such as tunable and narrow line-width lasers for use in uncontrolled environments and compact, low-power, flight-ready systems

### Optical Systems

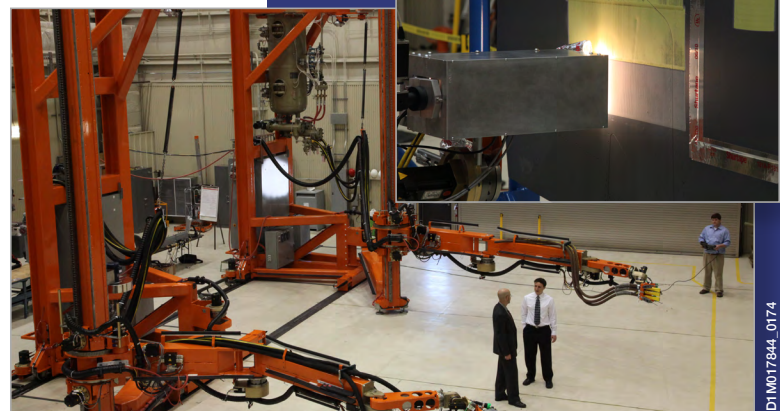
With more than 30 years of experience in developing advanced optical and electro-optical systems, SwRI's innovative solutions for clients include:

- Optical and electro-optical system design, simulation and analysis
- Development of incoherent light sources and solar simulation
- Opto-mechanical design and analysis, including modal and vibration analysis
- Space-qualified optical instrument design and fabrication
- Fabrication and system integration

Live cell fluorescence imaging monitors the cellular internalization of nanoparticles (red quantum dots). Scientists use this technology to study live cell molecular activity.



Robotic de-paint, or paint stripping of aged coatings on aircraft, integrates a new high-precision laser and machine vision closed-loop control system for paint, top coat and primer removal of aircraft coatings.



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## Institute Quality Systems

The Institute maintains a number of quality certifications including ISO13485:2003 certification that is compliant with the U.S. FDA Quality System Regulation for medical device development and evaluation. Institute quality certifications are monitored and maintained by the Institute Quality Systems and assist the Institute with implementation of the Quality Management System.

## Intellectual Property

As part of a long-held tradition, patent rights arising from sponsored research at the Institute are often assigned to the client. SwRI generally retains the rights to Institute-funded advancements.

## Facilities

SwRI's laboratories are outfitted with state-of-the-art instrumentation and equipment including unique facilities such as our large anechoic and resonance chambers and the capability to calibrate and characterize optical systems operating within the extreme ultraviolet spectral region. In addition to the 17,000-square-foot main machine shop, our precision mechanical fabrication shop fabricates precision parts for optical and spaceflight systems. The shop operates under a quality program that meets the requirements for both NASA and the U.S. military. The facilities available at the Institute provide clients with true end-to-end development, testing and evaluation capabilities.



SwRI's large anechoic chamber



*Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute occupies 1,500 acres in San Antonio, Texas, and provides more than 2.3 million square feet of laboratories, test facilities, workshops and offices for more than 2,700 employees who perform contract work for industry and government clients.*

**We welcome your inquiries.**

**For additional information,  
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Benefiting government,  
industry and the public  
through innovative science  
and technology