

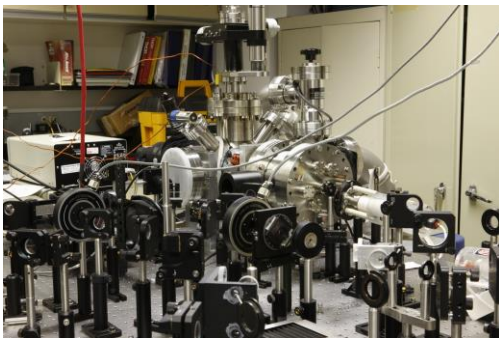
Mission

To be a leader in research, education, and service on thin films, materials characterization, and laser-materials interaction.

Working to Innovate

What we are doing:

- Thin film fabrication and characterization
- Materials characterization
- Nanoscale mechanical behavior of materials
- Electronic materials
- Photovoltaic thin films
- Superconducting thin films
- Ultrafast laser diagnostics
- laser-material processing
- Laser-plasma ion sources
- Laser-based sensors
- Thin film sensors
- Negative electron affinity photocathodes
- Applications of nanotubes and nanoparticles



OLD DOMINION UNIVERSITY
Frank Batten College of
Engineering *and* Technology

Applied Research Center
Batten College of Engineering & Technology
Old Dominion University
12050 Jefferson Avenue Suite 721
Newport News, Virginia 23606
Phone: (757) 269-5643
Fax: (757) 269-5644
<https://www.odu.edu/engineering/applied-research-center>

Faculty

Dr. Hani Elsayed-Ali
Professor, Department of Electrical & Computer Engineering,
Director, ODU Applied Research Center

Laser-solid interactions; laser-plasma ion sources; ultrafast laser probing of solid-state processes; thin film fabrication

Dr. Helmut Baumgart
Professor, Department of Electrical & Computer Engineering

Nanotechnology; microelectronics fabrication; high-k dielectrics for advanced gate stack engineering; atomic layer deposition (ALD) technology of electronic thin film materials; semiconductor device processing; thin film growth; ALD of ZnO for detector and sensor applications

Dr. Abdelmageed Elmustafa
Professor, Department of Mechanical & Aerospace Engineering

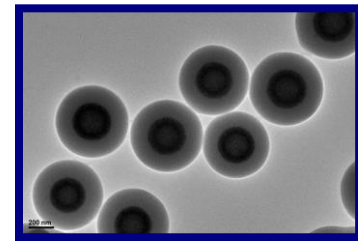
RF accelerators breakdown; nanoscale mechanical behavior of materials; nanoindentation; dislocation and strain gradient plasticity; thin films (mechanical properties and characterization); modeling and simulation of nanoindentation creep and contact mechanics; nanopositioners; friction stir welding; corrosion prevention

Dr. Sylvain Marsillac
Professor, Department of Electrical & Computer Engineering

Microelectronics; solar cells; inorganic materials synthesis and deposition; materials and devices characterization; thin films and devices fabrication; negative electron affinity photocathodes

Dr. Gon Namkoong
Professor, Department of Electrical & Computer Engineering

Development of nitride/ZnO-based materials and devices on innovative substrate materials; applying new growth techniques to facilitate material and device improvements; development of organic, hybrid organic-inorganic, inorganic solar cells



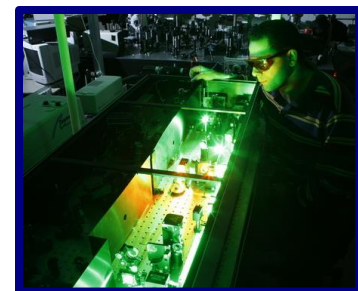
NANOTECHNOLOGY



THIN FILM DEPOSITION



MATERIALS CHARACTERIZATION



LASER-MATERIAL INTERACTION

A
P
P
L
I
E
D

R
E
S
E
A
R
C
H

C
E
N
T
E
R



In the Laboratory

MATERIALS FABRICATION & PROCESSING

- Atomic layer deposition (ALD)
- RF/DC magnetron sputtering
- Pulsed laser deposition (PLD)
- Thermal evaporation
- Spin coating
- Electron beam lithography (EBL)
- Photolithography
- Rapid thermal processing (RTP)
- Laser micromachining
- Laser surface treatment
- Laser ions source

MATERIALS CHARACTERIZATION

- High resolution transmission electron microscope (HRTEM)
- Scanning electron microscope (SEM)
- Energy dispersive spectroscopy (EDS)
- Atomic force microscope (AFM)
- X-ray diffraction (XRD)
- Nanoindentation
- Lifetime fluorescence spectroscopy
- UV-Vis spectroscopy
- Probe station for electrical device testing
- Semiconductor device analyzer
- Optical microscope
- Time-resolved electron diffraction
- Reflection high-energy electron diffraction (RHEED)

LASERS

- Femtosecond Ti:sapphire laser
- Q-switched Nd:YAG laser
- Excimer laser

Astrella Amplified Femtosecond Ti: Sapphire Laser



Fabrication and Characterization

Laser MCI system



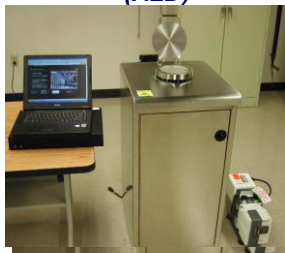
PerkinElmer LAMBDA 45 UV/Vis Spectrometer



Coherent Excimer laser

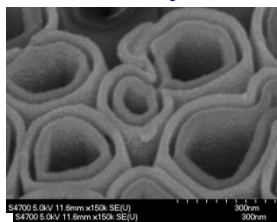


Atomic layer deposition (ALD)



Rigaku MiniFlex II XRD

HfO₂ tube-in-tube structure by ALD



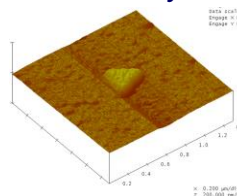
AJA ATC Orion 5 RF/DC Sputtering System



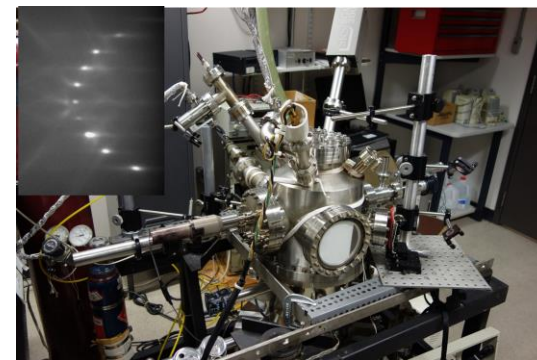
JEOL JSM-6060LV SEM



Triangular Ag nanoparticle fabricated by EBL



UHV femtosecond laser PLD system with RHEED



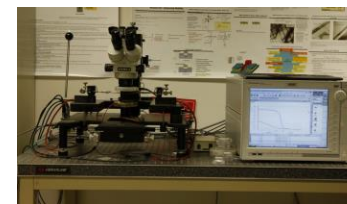
Nanoindenter XP from MTS



Bruker Edge atomic force microscope (AFM)



Probe station and Agilent B1500A semiconductor device analyzer



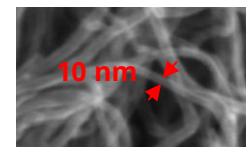
JEOL JEM-2100F field emission HRTEM



FEI Helios NanoLab 450S DualBeam FIB/SEM



Carbon nanotubes



Au nanoparticle

