

# CENTER FOR NANOSCALE MATERIALS SCIENTIFIC CONTACTS

## Nanofabrication and Devices

**Dafei Jin (Interim Group Leader)** .....djin@anl.gov  
ultralow temperature/strong magnetic field measurement,  
FIB/SEM dual beam imaging and patterning

**David Czaplewski** .....dczaplewski@anl.gov  
MEMS/NEMS, electron beam lithography, CVD

**Alan Dibos** .....adibos@anl.gov  
nanophotonics

**Ralu Divan** .....divan@anl.gov  
electron beam lithography, nanogels, MEMS/NEMS

**Xu Han** .....xu.han@anl.gov  
high-frequency piezo-optomechanical spectroscopy, CVD

**C. Suzanne Miller** .....csmiller@anl.gov  
XeF<sub>2</sub>, evaporation, RTP, dicing saw

**Liliana Stan** .....lstan@anl.gov  
ALD, PVD, sputtering, evaporation

**Anirudha Sumant** .....sumant@anl.gov  
superlubricity, diamond-based NEMS, CNT, graphene  
wear/friction measurements

## MAJOR TOOLS

- JEOL 8100FS, 100kV electron beam lithography
- Raith 150, 30kV electron beam lithography
- FEI Nova 600 NanoLab DualBeam FIB/SEM
- Karl Suss MA6 Optical mass aligner
- ASML PAS 5000 wafer stepper
- Direct write optical lithography
- Interferometric lithography
- AJA oxide sputtering
- Xactix XeF<sub>2</sub> etcher
- AMI 5-1-1Telsa Vector Magnet
- Wet chemistry & metrology
- SPM, PSIA XE-HDD
- Deposition (Temescal ebeam evaporators, AJAs, atomic layer deposition (ALD), etc.)
- Lambda microwave plasma CVD nanocrystalline diamond
- Thermal/PECVD for CNT/graphene synthesis
- Tribometer for friction and wear measurements
- BlueFors LD400 10mK Dilution Refrigerator System

## Quantum and Energy Materials

**Nathan Guisinger (Group Leader)**.....nguisinger@anl.gov  
UHV STM, AFM, 2-D materials, STS, cryo-STM  
with magnetic field

**Brandon Fisher** .....bfisher@anl.gov  
XRD, magnetometry, electrical measurements

**Jeffrey Guest** .....jrguest@anl.gov  
STM, laser spectroscopy and nanomechanical  
dynamics, ambient AFM

**Saw Wai Hla** .....shla@anl.gov  
LT-STM, SP-STM, AFM, SX-STM

**Xiao-Min Lin**.....xmlin@anl.gov  
synthesis of nanocrystals, TGA/DSC,  
rheometry at Sector 8 of APS, glovebox

**Volker Rose** .....vrose@anl.gov  
synchrotron X-ray scanning tunneling microscopy

**Dan Rosenmann**.....rosenmann@anl.gov  
evaporation, deposition, sputtering

## MAJOR TOOLS

- UHV SPM (AFM/STM) (Omicron)
- VT-AFM (Omicron XA) with optical access
- Createc LT-STM
- Cryo-STM w/magnetic field
- Scanning probe microscope, AFM (Veeco)
- Kurt Lesker electron beam evaporator and sputtering, deposition
- Magnetometry (QD PPMS & MPMS)
- TGA/DSC
- Luminescence/UV-vis-NIR
- X-ray diffractometer (Bruker D2 & D8)
- Integrated glovebox system
- Synchrotron X-ray STM (SX-STM) at Sector 4 of APS

### CONTACT

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## Theory and Modeling

### Subramanian Sankaranarayanan (Group Leader)

ssankaranarayanan@anl.gov  
nanoscale oxide energy materials, machine learning

**Maria Chan**.....mchan@anl.gov  
photovoltaics, photocatalysts, thermoelectrics, batteries, informatics, atomistic modeling integration w/expt

**Pierre Darancet** .....pdarancet@anl.gov  
charge and energy transport, optoelectronics; exciton dynamics

**Stephen Gray**.....gray@anl.gov  
nanophotonics, electrodynamics

**Michael Sternberg** .....sternberg@anl.gov  
software development

## Nanophotonics and Biofunctional Structures

**Richard Schaller (Interim Group Leader)** ..... schaller@anl.gov  
transient absorption/emission spectroscopy, solar energy

**Anindita (Oni) Basu**..... abasu@anl.gov  
microfluidics, nanobio materials

**Benjamin Diroll**..... bdiroll@anl.gov  
synthesis, time-resolved spectroscopy

**Chris Fry** ..... h fry@anl.gov  
synthesis, peptide synthesis, HPLC, CD

**David Gosztola** ..... gosztola@anl.gov  
lasers, Raman microscopy

**Xuedan Ma**..... xuedan.ma@anl.gov  
single molecule/particle spectroscopy

**Tijana Rajh**..... rajh@anl.gov  
TiO<sub>2</sub> nanoparticles, EPR, integration with biomolecules, catalysis

**Elena Rozhkova** ..... rozhkova@anl.gov  
bio(in)organic, biological chemistry, synthetic biology, GC/MS

**Elena Shevchenko** ..... eshevchenko@anl.gov  
2-D and 3-D nanoparticle assembly, SEM

**Xufeng Zhang** ..... xufeng@anl.gov  
nanolog spectrofluorimeter

## Electron and X-ray Microscopy

**Martin Holt (Interim Group Leader)**..... mvholt@anl.gov  
X-ray diffraction, ptychography and fluorescence

### Electron Microscopy

**Rachel Koritala**..... koritala@anl.gov  
SEM/TEM trainer

**Haihua Liu**..... haihua.liu@anl.gov  
TEM, STEM, EELS, SAED

**Yuzi Liu** ..... yuziliu@anl.gov  
analytical TEM, in situ TEM

**Jianguo Wen**..... jwen@anl.gov  
ACAT, TEM, batteries, PV

### Synchrotron X-ray Microscopy

**Mathew Cherukara** ..... mcherukara@anl.gov  
X-ray diffraction

### MAJOR TOOLS

- Nanoscience Computational Facility 30 TFlop cluster for:
  - Density-functional-based tight-binding
  - Time-domain nanophotonics simulation
  - MPI-based parallel versions of nanophotonics and tight-binding codes
- GPAW; real space, grid-based DFT-PAW
- Access to Argonne computer facilities
- Support for experimental projects
- Support for theoretical projects
- (DFTB) electronic structure package
- BLAST
- FANTASTX

### MAJOR TOOLS

- Ultrafast transient absorption spectroscopy
- Confocal Raman microscope, Renishaw
- VIS/NIR microscopy
- Time-resolved emission spectroscopy
- Time-correlated single photon counting
- UV-to-TH<sub>3</sub> ultrafast spectroscopy
- Single photon microscope for optics (SNSPD)
- Fluorescence spectroscopy
- Field-emission SEM (JEOL JSM7500F)
- Electron paramagnetic resonance (Bruker)
- Circular dichroism spectrometry
- Functionalization, electro/photo-chemical
- HPLC, GCMS
- Laser Scanning Confocal Microscope (Zeiss)
- Post-self-assembly processing
- Peptide synthesizer
- ZetaSizer Nano, Malvern
- Solar simulator, QEMS (Oriel)
- FTIR (Thermo-Nicolet)
- Synthesis & surface modification of nanoparticles
- Microfluidic Droplet Generation and Imaging
- Magneto-Electrical-Optical Spectrometer (MEOS)

### MAJOR TOOLS

#### Electron Microscopy

- ACAT: Argonne Chromatic Aberration-corrected TEM
- FEI Talos F200X TEM/STEM
- FEI Tecnai F20ST TEM/STEM
- Field-emission TEM (JEOL 2100F)
- Zeiss 1540XB FIB-SEM
- Zeiss NVision FIB-SEM
- Hitachi S-4700-II high-vacuum SEM
- FEI Quanta 400F environmental and variable-pressure SEM

#### X-ray Microscopy

- Hard X-ray nanoprobe beamline, Sector 26 of APS
- Scanning nanodiffraction and ptychography
- Chemical and structural nanoimaging
- Heating/cooling specimen stage
- 20-30 nm resolution, 6-12 keV
- In situ/in operando experiments