Center for Nanoscale Materials

Director: Supratik Guha
Industrial Liaison: Andreas Roelofs
User Office & Outreach Programs:
Katie Carrado Gregar
cnm_useroffice@anl.gov

Electronic & Magnetic Materials & Devices

Group Members

Saw Wai Hla (Group Leader), shla@anl.gov
- LT-STM, SP-STM, AFM

Anand Bhattacharya, anand@anl.gov,
- oxide MBE

Seth Darling, darling@anl.gov
- solar energy, organic PV, AFM, QEMS

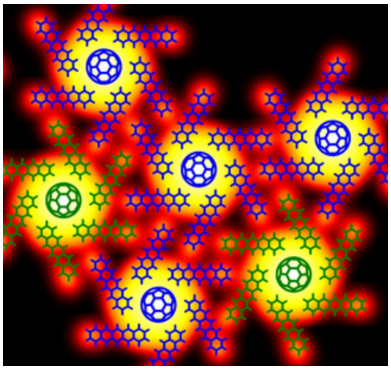
Brandon Fisher, fisher@anl.gov,
- magnetometry, STM/SEM, XRD

Jeffrey Guest, jrguest@anl.gov
- STM, AFM, ultrafast microscopy

Nathan Guisinger, nguisinger@anl.gov
- STM, AFM, graphene

Xiao-Min Lin, xmlin@anl.gov
- synthesis of nanocrystal building blocks

Dan Rosenmann, rosenmann@anl.gov
- evaporation, deposition, sputtering, MBE



Major Tools

- UHV SPM (AFM/STM) (Omicron Nanotechnology)
- 4-probe SEM (Omicron UHV Nanoprobe)
- VT-AFM (Omicron XA), LT-STM
- Scanning probe microscope, AFM (Veeco)
- Complex Oxide MBE (DCA R450D Custom)
- Kurt Lesker electron beam evaporator and sputtering, deposition
- Magnetometry (QD PPMS & MPMS)
- Solar simulator, QEMS (Oriel)
- TGA/DSC
- Luminescence/UV-vis-NIR
- X-ray diffractometer (Bruker D2 & D8)

NanoBio Interfaces

Group Members

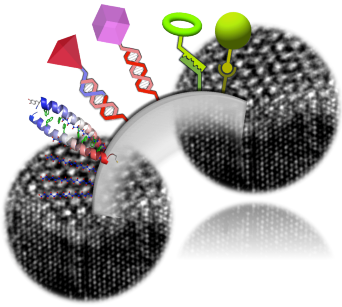
Tijana Rajh (Group Leader), rajh@anl.gov
- EPR, quantum dots, semiconductor-bio composites, LSCM

Chris Fry, hfry@anl.gov
- synthesis, peptide synthesis, HPLC, CD

Yuzi Liu, yuziliu@anl.gov
- analytical TEM

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



Major Tools

- Field-emission TEM (JEOL 2100F)
- Field-emission SEM (JEOL JSM7500F)
- Electron paramagnetic resonance (Bruker)
- Circular dichroism spectrometry
- Functionalization, electro/photochemical
- HPLC, GCMS
- Laser Scanning Confocal Microscope (Zeiss)
- Post-self-assembly processing
- Schlenk lines
- Solvent purification
- Peptide synthesizer
- Synthesis & surface modification of nanoparticles
- ZetaSizer Nano, Malvern

Nanofabrication & Devices

Group Members

Daniel Lopez (Group Leader), dlopez@anl.gov
- MEMS/NEMS technology

David Czaplewski, dczaplewski@anl.gov
- MEMS/NEMS, ICP CVD

Ralu Divan, divan@anl.gov
- lithography, nanogels, MEMS/NEMS

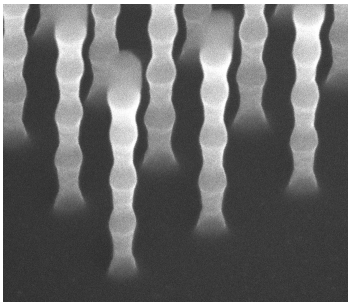
C. Suzanne Miller, csmiller@anl.gov
- dicing saw, Karl Suss aligner

Leo Ocola, ocola@anl.gov
- nanofabrication, electron beam lithography

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

Anirudha Sumant, sumant@anl.gov
- diamond-based NEMS, CNT, graphene

II Woong Jung, ijung@anl.gov
- focused ion beam lithography



Major Tools

- JEOL 9300, 100kV electron beam lithography
- Raith 150, 30kV electron beam lithography
- FEI Nova 600 NanoLab DualBeam FIB/SEM
- Karl Suss MA6 Optical mass aligner
- Nanonex NX-3000 Nanoimprint
- Direct write optical lithography
- Interferometric lithography
- AJA oxide sputtering
- Wet chemistry & metrology
- SPM, PSIA XE-HDD
- Deposition (ebeam evaporator and sputtering, Sundew ALD, MOCVD)
- Lambda microwave plasma CVD nanocrystalline diamond
- Thermal/PECVD for CNT/graphene synthesis

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Nanophotonics

Group Members

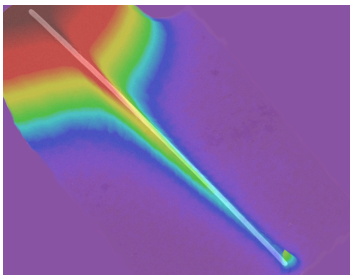
Gary Wiederrecht (Group Leader), wiederrecht@anl.gov
- microscopy below diffraction limit, UTAS

Zhe Fei, zfei@anl.gov
- 2-D materials, nano-imaging techniques

David Gosztola, gosztola@anl.gov
- lasers, Raman, near-IR, NSOM

Richard Schaller, schaller@anl.gov
- transient absorption/emission spectroscopy

Yugang Sun, ygsun@anl.gov
- synthesis/fab of functional nanomaterials
- optical, electronic, mechanical properties



Major Tools

- Colloidal synthesis
- Confocal Raman microscope, Renishaw
- Ultrafast transient absorption spectroscopy
- Time-resolved emission spectroscopy
- Time-correlated single photon counting
- Ultrafast microscope
- FTIR (Thermo-Nicolet)
- VIS/NIR microscopy
- Nanolog spectrofluorimeter
- Near field scanning probe

Theory & Modeling

Group Members

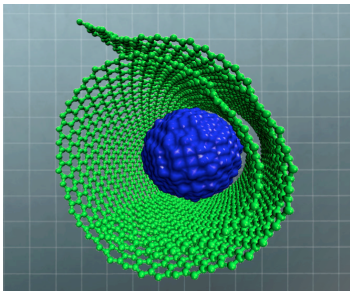
Stephen Gray (Group Leader), gray@anl.gov
- nanophotonics, electrodynamics

Maria Chan, mchan@anl.gov
- photovoltaics, photocatalysts, thermoelectrics, batteries

Pierre Darancet, pdarancet@anl.gov
- photovoltaics, optical transport

Michael Sternberg, sternberg@anl.gov
- software development

Subramanian Sankaranarayanan,
- ssankaranarayanan@anl.gov
- nanoscale oxide energy materials



Major Tools

- Nanoscience Computational Facility
  30 TFlop cluster for:
  - Density-functional-based tight-binding (DFTB) electronic structure package
  - 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

X-ray Microscopy

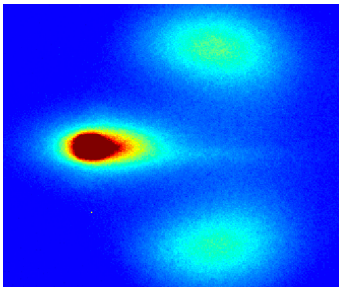
Group Members

Ian McNulty (Group Leader), mcnulty@anl.gov
- diffraction, holography, x-ray microscopy, optics

Martin Holt, mvholt@anl.gov
- x-ray diffraction and fluorescence

Volker Rose, vrose@anl.gov
- synchrotron x-ray scanning tunneling microscopy

Robert Winarski, winarski@anl.gov
- x-ray imaging and tomography



Major Tools

- Hard X-ray nanoprobe beamline, sector 26 of APS
- Scanning probe X-ray diffraction microscopy
- Scanning probe X-ray fluorescence microscopy
- Full-field two-dimensional transmission imaging and tomography
- Heating/cooling specimen stage
- 30 – 50 nm resolution, 8 - 12 keV
- In situ/in operando experiments
- Synchrotron x-ray STM (SX-STM)

Electron Microscopy Center

Group Members

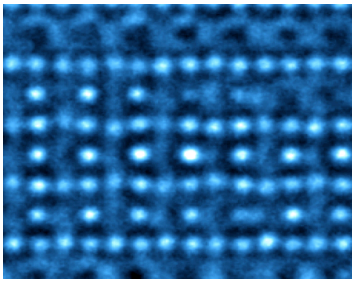
Dean Miller (Group Leader), miller@anl.gov
- oxide thin film and self-assembled synthesis

Rachel Koritala, koritala@anl.gov
- SEM/TEM trainer

Joyce Wang, jiewang@anl.gov
- EMC Facility Manager

Jianguo Wen, jwen@anl.gov
- ACAT, batteries, PV

Nestor Zaluzec, zaluzec@aaem.amc.anl.gov
- transmission, scanning transmission, and analytical electron microscopy (FEI Tecnai)



Major Tools

- ACAT: Argonne Chromatic Aberration-corrected TEM
- FEI Tecnai F20ST TEM/STEM
- Zeiss 1540XB FIB-SEM
- FEI CM30T, analytical transmission electron microscope
- Hitachi S-4700-II high-vacuum SEM
- FEI Quanta 400F environmental and variable-pressure SEM

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