2020

The Center for Integrated Nanotechnologies (CINT) is a Department of Energy Office of Science user facility. CINT offers world-leading scientific expertise and specialized capabilities to create, characterize, and integrated nanostructured materials at a range of length scales. It is jointly operated by Los Alamos and Sandia national laboratories and leverages the unmatched scientific and engineering expertise of the host labs.

CINT supports four scientific thrusts that serve as synergistic building blocks for integration research available to the user community: Quantum Materials Systems; Nanophotonics and Optical Nanomaterials; In-Situ Characterization and Nanomechanics; and Soft, Biological, and Composite Nanomaterials. Access to capabilities is via peer-reviewed technical proposals. Visit our website: https://cint.lanl.gov.

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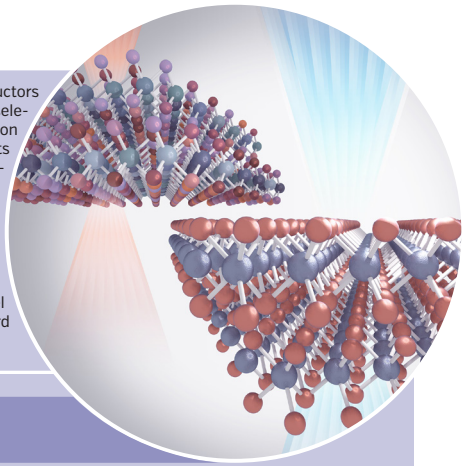

For 2D indirect semiconductors like bilayer tungsten diselenide, isotopic purification unexpectedly blue-shifts the optical emission energy by an observable amount corresponding with the change in electronic band gap renormalization energy brought about by changes in mass. Credit: Michael Pettes, Daniel Edward Judge, Jr.

January

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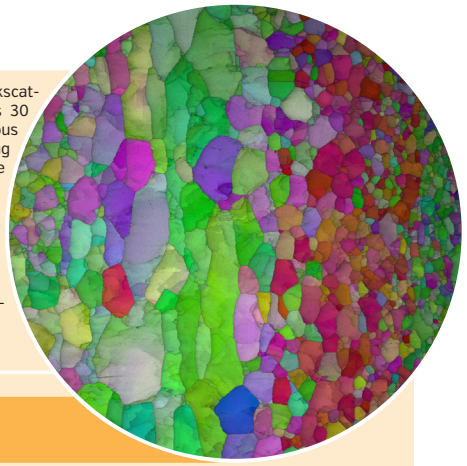

High-speed electron backscatter diffraction at CINT is 30 times faster than previous technology at mapping the structure of crystalline materials. In this image, 1.8 million crystal orientation measurements of niobium sheet were performed in just 30 minutes. Credit: Emily Brady, Eric Taleff, Nathan Heckman, Brad Boyce.

February

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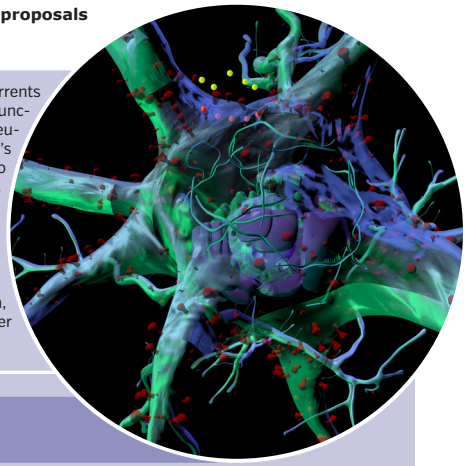
Spring call for user proposals open March 1-31



A graphic of the ionic currents responsible for healthy, functional, and pathological neuron activity. Work in CINT's Integration Lab aims to measure these currents and how they can be modulated by drugs to hopefully find effective medications for neurodegenerative diseases. Credit: Shadi Dayeh, Youngbin Tchoe, Jennifer Martinez, Jinkyoung Yoo.

March

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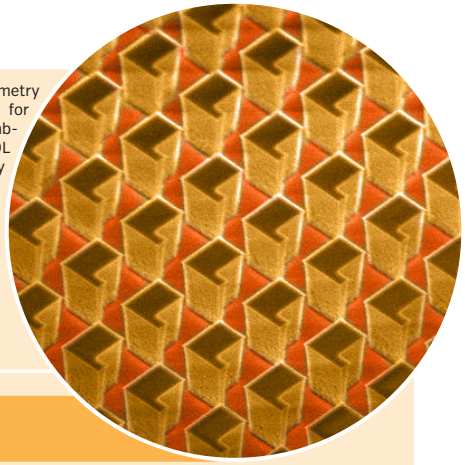

Arrays of broken-symmetry silicon nano-resonators for mid-infrared photonics, fabricated at CINT using JEOL electron beam lithography and Oxford reactive ion etching systems. Credit: Peter Jeong, Igal Brener.

April

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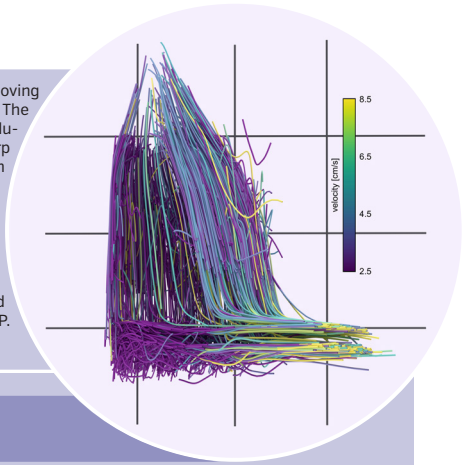

Trajectories of particles moving along fluid streamlines. The inlet region of this microfluidic device causes a sharp direction change, which affects the streamlines. CINT's 3D astigmatic macroscope images particle flow, showing trajectories organize into a hollow sheath-like structure in this region (0.5mm grid spacing). Credit: Duncan P. Ryan, James Werner.

May

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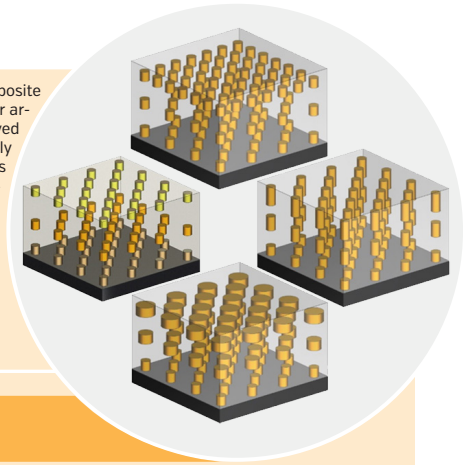

A 3D super-nanocomposite with ordered nanocylinder arrays in thin films is achieved by incorporating vertically aligned nanocomposites into a multilayer/superlattice architecture. The dimension and vertical/lateral spacings of nanocylinders can be precisely controlled. Credit: Aiping Chen.

June

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2020

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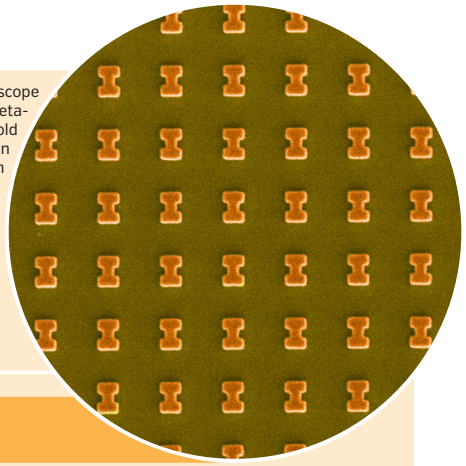

Scanning electron microscope image of a plasmonic metasurface comprising of gold dogbone resonators on top of AlSb/InAs quantum wells. The image was taken using the SEM2 in CINT's Integration Lab. Credit: Sebastian Gies, Igal Brener.

July

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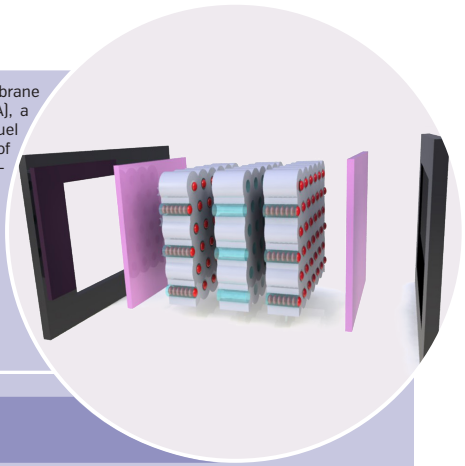

A rendering of a Membrane Electrode Assembly (MEA), a critical component for fuel cells, that is composed of nanostructured polymerized ionic liquids. Credit: Millie Firestone, Chris Sheehan.

August

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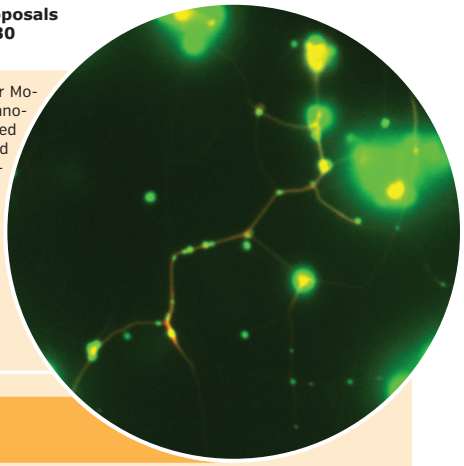
Fall call for user proposals open September 1-30



Using CINT's Biomolecular Motors capability, a lipid nanotube network is fabricated from phase-separated giant unilamellar vesicles and gliding microtubule-kinesin motility. Saturated lipids sequester into nodes along the tube (green). Credit: Zachary Imam, George Bachand.

September

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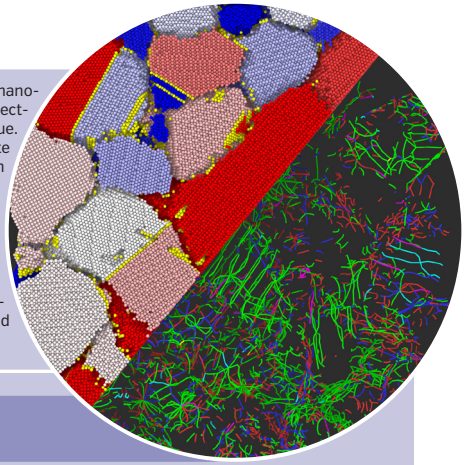

Atomistic simulation of a nanocrystalline nanowire subjected to mechanical fatigue. Colors indicate crystallite size (blue to red), twin planes (yellow), and dislocation types (colored lines). Simulations like this aid the mechanistic interpretation of other characterization methods. Credit: Cody Kunka, Stephen Foiles, Brad Boyce, Rémi Dingreville.

October

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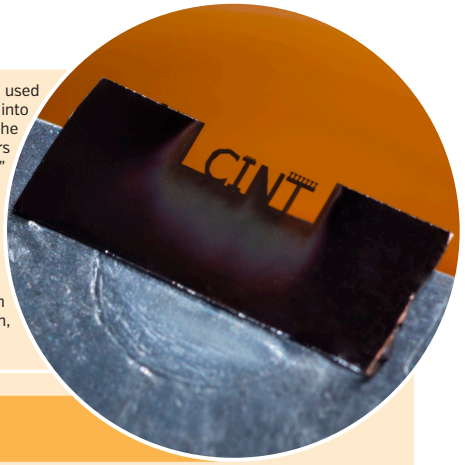

CINT's FemtoScribe was used to cut out the word "CINT" into nanocrystalline copper. The tiny pillars and tensile bars on top of the "I" and "T" are on the scale of tens of micrometers. Structures like these are made to investigate the impact of small features on the mechanical response of a material. Credit: Jonathan Gigax, Quinn McCulloch, Kevin Sutton.

November

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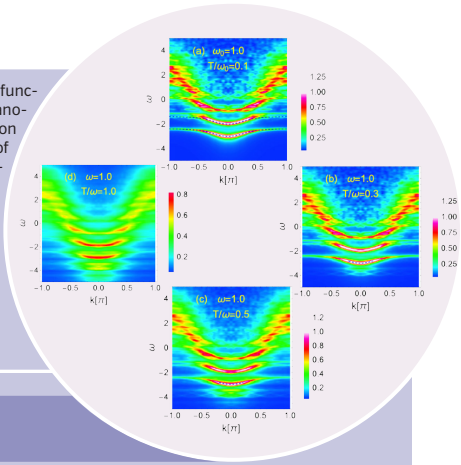

The calculated spectral function of an electron in a nanowire with electron-phonon coupling, as a function of momentum and temperature. A bare electron is injected with a scanning tunneling microscope or photoemission, creating many excited states. Credit: Janez Bonca, Mona Berciu, Stuart Trugman.

December

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