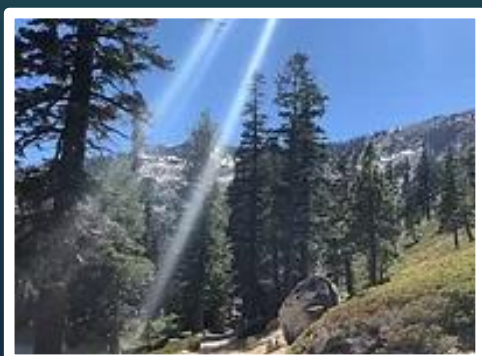
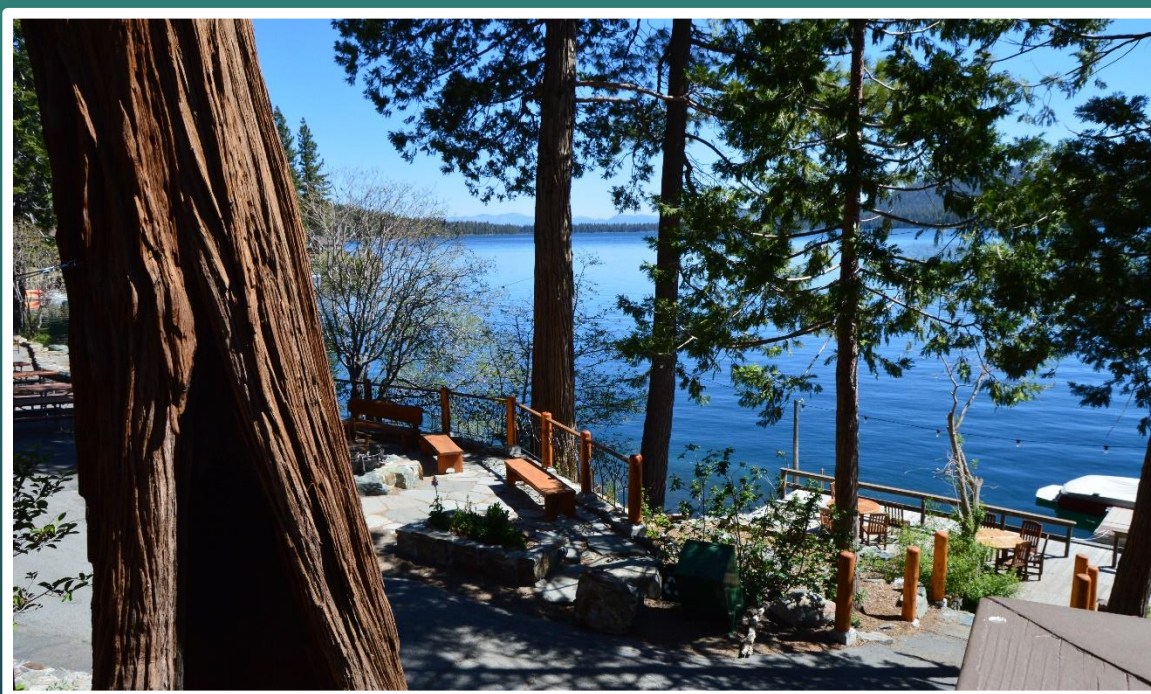

29th AACGE Western Section Conference on Crystal Growth & Epitaxy

Stanford Sierra Camp, Fallen Leaf Lake, CA

June 7-11, 2026



Welcome to Stanford Sierra Conference Center

The following information will help you during your stay at our lakeside retreat and enjoy your visit to the fullest!

The best way to keep in touch with the office and home is to bring a laptop with wireless capability. Our wireless network is available throughout the camp, including lodge rooms, meeting rooms, and common areas in the main lodge, as well as in the cabins.

Cell service is spotty and inconsistent at Fallen Leaf Lake so plan to be without cell reception during your stay.

You can receive phone messages at 530-541-1244 and receive faxes at 530-541-2212.

Registration, registration payment, and registration concerns can be emailed to aacg@comcast.net. Visit www.crystalgrowth.org to register and/or pay online.

We post phone messages and faxes on the guest message board across from the office. Check out time on departure day is 10:00.

Our website is www.stanfordsierra.com.

Morgan Marshall
Sales & Marketing Director (530) 541-1244 ext.125
mdmarshall@stanford.edu

Conference Contacts

Conference Chair

Talid Sinno
University of Pennsylvania
talid@seas.upenn.edu

Program Chairs

Katie Colbaugh
Leucite
kecolbaugh@gmail.com

Ganesh Balakrishnan
University of New Mexico
gunny@unm.edu

Moneesh Upmanyu
Northeastern University
m.upmanyu@northeastern.edu

Kristen Fichthorn
Penn State University
fichthorn@psu.edu

Jong Seto
Arizona State University
jong.seto@asu.edu

Local Arrangements

Luis A. Zepeda-Ruiz
AACG Treasurer
Lawrence Livermore National Laboratory
zepedaruiz1@llnl.gov

Registration Support

Shoshana Nash
AACG Administrator
admin@crystalgrowth.org

Stanford Sierra Camp Contact

Morgan Marshall
Sales & Marketing Director
(530) 541-1244 ext.125
mdmarshall@stanford.edu

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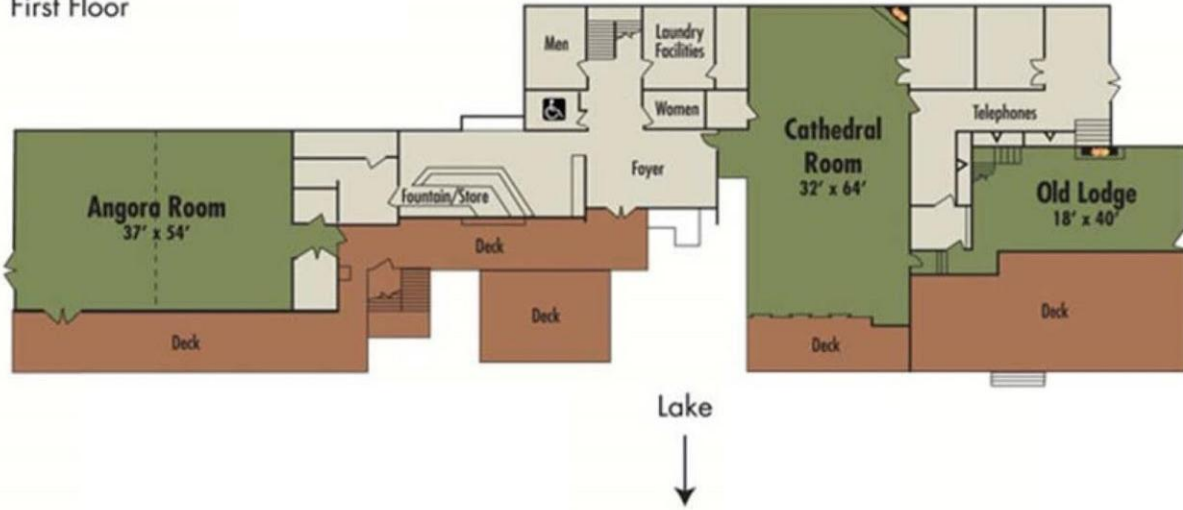


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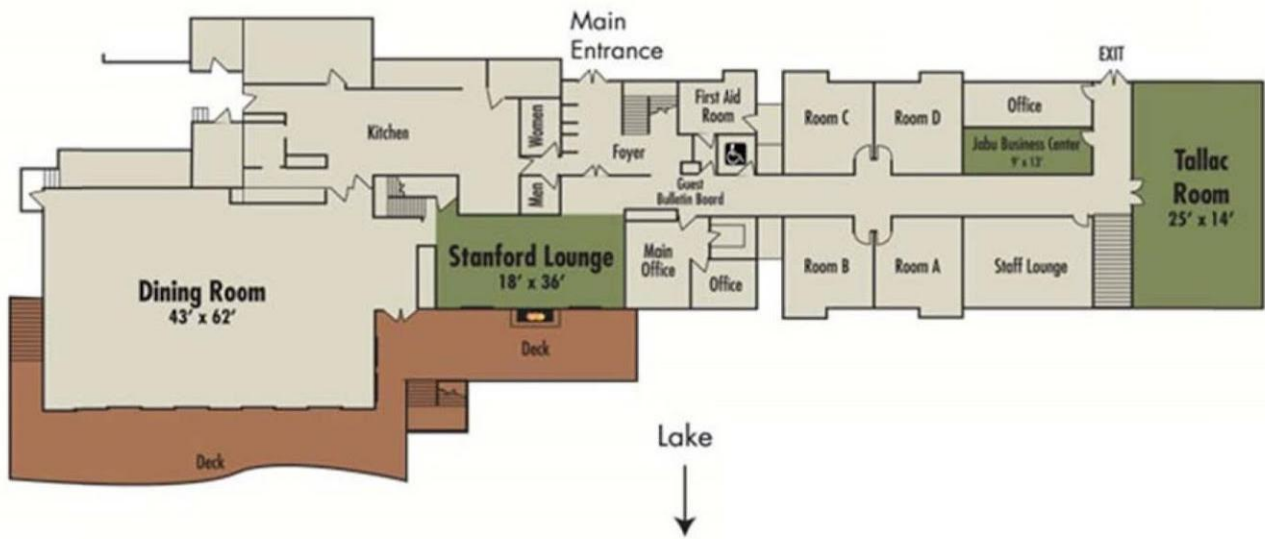
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Main Lodge Facilities

First Floor



Second Floor



 = Fireplace

Cell Phone reception at Fallen Leaf Lake is inconsistent.

High-Speed Internet available in all rooms and on main lodge decks.

Program Guide

Sunday, June 7, 2026

Stanford Lounge	15:00 – 18:00	Camp Check-in & Conference Registration
Old Lodge Deck	16:30 – 18:00	Welcome Reception
Dining Room	18:00 – 19:30	Dinner
Cathedral Room	19:30 – 21:00	Epitaxial Crystal Growth

Monday, June 8, 2026

Dining Room	7:30 – 9:00	Breakfast
Cathedral Room	9:30 – 10:30	Fundamentals of Crystallization
	10:30 – 11:00	Break
Cathedral Room	11:00 – 12:00	Fundamentals of Crystallization
Dining Room	12:00 – 13:30	Lunch
	13:30 – 16:00	Camp Activities Unscheduled Time
Angora Room	16:00 – 18:00	Posters
Dining Room	18:00 – 19:30	Dinner
Cathedral Room	19:30 – 20:15	Plenary Lecture I
Cathedral Room	20:20 – 21:10	Colloidal Crystallization

Tuesday, June 7, 2026

Dining Room	7:30 – 9:00	Breakfast
Cathedral Room	9:30 – 10:30	Session
	10:30 – 11:00	Break
Cathedral Room	11:00 – 11:40	AI/ML for Crystal Growth
Deck	11:45 – 12:00	Meeting Photo
Dining Room	12:00 – 13:30	Lunch
	13:30 – 16:00	Camp Activities Unscheduled Time
Angora Room	16:00 – 18:00	Podcast
Dining Room	18:00 – 19:30	Dinner
Cathedral Room	19:30 – 20:15	Plenary Lecture II
Cathedral Room	20:20 – 21:10	Colloidal Crystallization

Wednesday, June 8, 2026

Dining Room	7:30 – 9:00	Breakfast
Cathedral Room	9:30 – 10:30	Biological & Biomimetic Materials
	10:30 – 11:00	Break
Cathedral Room	11:00 – 12:10	Biological & Biomimetic Materials
Dining Room	12:00 – 13:30	Lunch
	13:30 – 16:00	Camp Activities Unscheduled Time
Angora Room	16:00 – 17:00	Student Panel
Dining Room	17:30 – 19:30	Dinner
Cathedral Room	19:30 – 21:10	Epitaxial Crystal Growth

Thursday, June 9, 2026

Dining Room	7:30 – 9:00	Breakfast
Cathedral Room	9:30 – 10:30	Fundamentals of Crystallization
	10:30 – 11:00	Break
Cathedral Room	11:00 – 12:00	Fundamentals of Crystallization
Dining Room	12:00 – 13:30	Lunch & Camp Departure

Program

Sunday, June 7, 2026

19:30 – 21:00 Epitaxial Crystal Growth I

Cathedral Room

Chair: Ganesh Balakrishnan

19:30 – 20:00 Atomic-scale characterization of growth and overgrowth of III-V semiconductor nanostructures. – **Invited** – Rainer Timm, Lund University

20:00 – 20:20 Strain- and instability-driven lateral compositional modulation of compound semiconductors – can we make use of it? Sang Han, University of New Mexico

20:20 – 20:40 Engineering epitaxial quantum dots for telecommunication wavelength single photon emitter applications. Ganesh Balakrishnan, University of New Mexico

20:40 – 21:00 Epitaxial oxidation sequences in titanium and scandium nanoislands. Pip Knight, Massachusetts Institute of Technology

Monday, June 8, 2026

9:00 – 10:30 Fundamentals of Crystallization I

Cathedral Room

Chair: Kristen Fichthorn

9:00 – 9:30 Two-step crystallization and polymorph selection in 3-chloromandelic acid. – **Invited** –
Michael Gruenwald, University of Utah

9:30 – 9:50 Molecular origins of competing nucleation pathways in complex environments.
Nikhil Rampal, Lawrence Livermore National Laboratory

9:50 – 10:10 Observations on the oxygen ion behavior in high temperature solutions.
Vincent Fratello, Retired

10:10 – 10:30 Unprecedented packing polymorphism of oxindole: an exploration inspired by crystal structure prediction.
Xiaolong Zhu, Merck

10:30 – 11:00 Break

11:00 – 11:20 Replacement of the Ostwald rule of stages to predict the sequence of appearance of crystal polymorphs.
Peter Vekilov, University of Houston

11:20 – 11:40 Dynamic studies of material properties at the Lawrence Livermore National Laboratory.
Thomas Lockard, Lawrence Livermore National Laboratory

11:40 – 12:00 Iron acquisition and mineral transformation by cyanobacteria living in extreme environments.
David Kisailus, University of California Irvine

Monday, June 8, 2026

16:00 – 18:00 Poster Session

Angora Room

Chair: Jong Seto

P1

P2

P3

P4

P5

P6

P7

P8

P9

P10

Monday, June 8, 2026

19:30 – 21:10 Plenary Lecture & Colloidal Crystallization I

Cathedral Room

Chair: Talid Sinno

19:30 – 20:15 Dislocation and 2D nucleation mechanisms in large organic and inorganic crystals grown from solution. – **Plenary I** –
Natalia Zaitseva, Lawrence Livermore National Laboratory

20:20 – 20:50 Cracking colloidal crystallization: classical nucleation and growth with a twist. – **Invited I** –
Benjamin Rogers, Brandeis University

20:50 – 21:10 FFT-based analysis of quantum dot superlattices.
Ken Seungmin Hong, Brown University

Tuesday, June 9, 2026

9:00 – 10:30 Artificial Intelligence & Machine Learning for Crystal Growth
Cathedral Room

Chair: Katie Colbaugh & Moneesh Upmanyu

9:00 – 9:30 High-fidelity atomistic simulations of alloy solidification. – **Invited** –
Rodrigo Freitas, Massachusetts Institute of Technology

9:30 – 9:50 Data-driven coarse-graining: Discovering continuum scale models from
atomistic simulations.
Amit Samanta, Lawrence Livermore National Laboratory

9:50 – 10:10 Predicting antimalarial activity modes in hemozoin crystallization using a
priori machine learning.
Hariharan Annadurai, University of Houston

10:10 – 10:30 Identifying useful nanocrystal morphologies using advanced sampling
techniques and machine learning.
Kirsten Fichthorn, Penn State University

10:30 – 11:00 Break

11:00 – 11:20 A comparative study of PIML and general ML/AI approaches for industrial
crystal growth.
Katie Colbaugh, Leucite

11:20 – 11:40 TBD.
Timofey Frolov, Lawrence Livermore National Laboratory

Tuesday, June 9, 2026

11:45 – 12:00 Group Photo
Outside Deck

Chair: Luis Zepeda-Ruiz

11:45 – 12:00 All attendees invited for our group photo.

Tuesday, June 9, 2026

16:00 – 18:00 Podcast
Angora Room
Chair: Dhruvaite Upmanyu

16:00 – 18:00 Everyone is encouraged to be interviewed.

Tuesday, June 9, 2026

19:30 – 21:10 Plenary Lecture & Colloidal Crystallization II
Cathedral Room
Chair: Talid Sinno

19:30 – 20:15 Self-assembly and crystallization at protein-inorganic interfaces.
– **Plenary II** –
James DeYoreo, Pacific Northwest National Laboratory

20:20 – 20:50 Computational self-assembly of diverse colloidal crystal and cluster structures. – **Invited** –
Julia Dshemuchadse, Cornell University

20:50 – 21:10 Can hydrodynamic interactions explain anomalously fast nucleation in weakly-supersaturated colloidal fluids?
Talid Sinno, University of Pennsylvania

Wednesday, June 10, 2026

9:00 – 10:30 Biological & Biomimetic Materials

Cathedral Room

Chair: Jong Seto

9:00 – 9:30 Control over crystallization from metastable mineral precursors by manipulation of polyelectrolytes. – **Invited** –
Thomas Schroeder, North Carolina State University

9:30 – 10:00 Mesoporous frameworks engineered from crystallizable collagen-mimetic peptide amphiphiles. – **Invited** –
Andrea Merg, University of California Merced

10:00 – 10:20 Template-directed toxicity sink: molecular mechanisms of lithium-mediated A β 42 oligomer–fibril interconversion.
Radhika Sunil Menon, University of Houston

10:20 – 10:40 Organization and complexation of an extracellular matrix protein with Ca²⁺ ions.
Jong Seto, Arizona State University

10:30 – 11:00 Break

11:00 – 11:30 High-resolution structural studies at the interface of biology and materials science. – **Invited** –
Brent Nannega, Arizona State University.

11:30 – 11:50 The structural landscape of amyloid- β oligomerization by high-speed AFM.
Nghia Nguyen, University of Houston.

11:50 – 12:10 Clustering of Zn in ectopic biominerals at the biological interfaces in the temporomandibular joint and the kidney.
Sunita Ho, University of California San Francisco

Wednesday, June 10, 2026

16:00 – 17:30 Poster Award Talks & Career Panel Discussion

Angora Room

Chair: Luis Zepeda-Ruiz

16:00 – 16:15 Poster Awards talks.

16:15 – 17:30 Career Panel Discussion.

Wednesday, June 10, 2026

19:30 – 21:00 Epitaxial Crystal Growth II

Cathedral Room

Chair: Ganesh Balakrishnan

19:30 – 20:00 Modeling SiGe quantum dot variability induced by interface disorder reconstructed from multi-perspective microscopy. – **Invited** – Ezra Bussman, Sandia National Laboratory

20:00 – 20:30 Oxide thin films for electronic and optical applications. – **Invited** – Wilfrid Prellier, Centre National de la Recherche Scientifique (CNRS)

20:30 – 20:50 Analytical x-ray solutions for thin film and wafer analysis. Destiny Lopez, Malvern Panalytical

20:50 – 21:10 Correlating epitaxial growth and electronic properties of crystalline high-k metal oxides on 2D materials. Rishabh Kothari, Massachusetts Institute of Technology

Thursday, June 11, 2026

9:00 – 10:30 Fundamentals of Crystallization II

Cathedral Room

Chair: Kristen Fichthorn

9:00 – 9:30 From colloidal nano building blocks to higher order architectures.
– Invited –
Ou Chen, Brown University

9:30 – 9:50 The Impact of Wadsley defects and cation disorder on improving
MoNb₁₂O₃₃ diffusion.
Cristopher Sturgill, University of South Carolina

9:50 – 10:10 Solvent-dependent relative stability of crystal forms.
Rohith Pulluri, University of Houston

10:10 – 10:30 Coupling catalyst activity and degradation: modeling oxygen evolution
reaction with surface dissolution on IrO₂(110).
Rhys Bunting, Lawrence Livermore National Laboratory

10:30 – 11:00 Break

11:00 – 11:20 Atomic-scale insights into calcite dissolution kinetics in nonstoichiometric
solutions and the role of Mg²⁺ ions.
Shuhong Song, Pacific Northwest National Laboratory

11:20 – 11:40 Crystallization entropy: constituents and contributions to crystal form
stability.
Alejandro Veliz, University of Houston

11:40 – 12:00 TBD.
Moneesh Upmanyu, Northeastern University

Abstracts

Sunday, June 7, 2026

19:30 – 21:00 Epitaxial Crystal Growth

Atomic-scale characterization of growth and overgrowth of III-V semiconductor.

Rainer Timm, Lund University

III-V semiconductor nanostructures, with their superior charge carrier mobility and a direct and tunable band gap, are promising for next generation devices in electronics, photonics, energy harvesting, and quantum information. They offer a large flexibility in forming material, doping, or crystal phase heterostructures. III-V nanowires are especially interesting both from an application and crystal growth perspective, as they combine a complex interplay of lateral and radial growth, can crystallize in structures that are not stable in bulk, and can act as templates for growth of novel nanostructures.

We are using scanning tunnelling microscopy and spectroscopy (STM/S) as well as synchrotron-based X-ray photoelectron spectroscopy (XPS) in various setups for studying growth, atomic structure, and electronic properties of III-V semiconductor nanostructures at the atomic scale. Here, I will show STM/S results highlighting different stages of nanowire growth and overgrowth, where we map nanowires across axial heterostructures between different materials, doping level, or different crystal phase, and correlate the surface structure and local electronic properties, down to quantum size effects. Nanowire crystal phase heterostructures can act as templates for radial overgrowth with atomic-scale control, enabling the growth of novel types of nanostructures monitored by STM: Figure 1 shows the surface of a GaAs nanowire which has been exposed to Bi atoms, resulting in the self-selective growth of well-ordered GaBi 1D and 2D nanostructures on the surface of the wurtzite segment, while only individual Bi atoms or small Bi clusters were incorporated in the zincblende surface.

Bismuth incorporation in III-V semiconductor surfaces also leads to interesting growth phenomena upon 2D film growth. I will show examples of self-limiting Bi growth on InSb(111)B and of a honeycomb surface structure of Bi atoms on GaAs(111)B, which – in contrast to conventional Bismuthene – form strong covalent bonds to the As atoms of the underlying GaAs, but are only weakly bond to each other. These structures are promising for non-trivial topological behavior at room temperature and large Rashba splitting.

Strain- and instability-driven lateral compositional modulation of compound semiconductors - can we make use of it?

Sang Han, University of New Mexico

Phase instability and interatomic diffusion in epitaxially grown III–V semiconductors are generally associated with materials degradation and eventual device failure. Here, we explore whether these same processes can instead be used to produce lateral compositional modulation and bandgap engineering. Using GaAsSb/InP as a model system, we examine the evolution of a lattice-matched GaAsSb epilayer during high-temperature annealing. Rather than conventional spinodal decomposition alone, we observe pronounced migration of Sb from the GaAsSb epilayer into the InP substrate and counter-diffusion of P

from the substrate into the epilayer. This intermixing produces InSb-rich tips and facets of pyramidal nanostructures together with InGaAsP regions that replace the original GaAsSb layer. High-resolution x-ray diffraction, Raman spectroscopy, scanning transmission electron microscopy, and energy-dispersive x-ray spectroscopy collectively indicate that the transformation is driven by liquid-assisted phase separation associated with transient molten InSb, providing an alternative mechanism to previously proposed solid-state spinodal decomposition. By applying external biaxial strain through stressed SiNx capping layers, the net strain during annealing can be tuned from compressive to tensile. A critical strain appears to exist that strongly alters the resulting morphology, producing a transition from deeply penetrating intermixed domains to laterally confined InSb/InGaAsP layers while substantially slowing the kinetics of degradation. These results demonstrate that phase instability and interdiffusion can be directed by strain and may provide a route to controlled lateral compositional modulation in compound semiconductors.

Engineering epitaxial quantum dots for telecommunication wavelength single photon emitter applications.
Ganesh Balakrishnan, University of New Mexico

Epitaxial III–V quantum dots (QDs) are promising candidates for single-photon emitters, but conventional InAs/GaAs systems are limited in achieving emission at telecommunication wavelengths. This work explores alternative epitaxial growth pathways using arsenide and antimonide material systems to extend emission beyond 1.3 μm while maintaining control over morphology and optical properties.

InAs growth on InP substrates is investigated as a reduced lattice-mismatch system that enables thicker planar growth prior to three-dimensional island formation. On InP (001), anisotropic surface diffusion leads to elongated quantum dash structures, whereas growth on InP (311)B suppresses this anisotropy and promotes the formation of isolated, symmetric quantum dots exhibiting single-dot emission. Growth parameters such as coverage and growth rate are shown to critically influence the dimensional transition and dot density.

GaSb quantum dot formation on GaAs is also examined under varying stoichiometric conditions. Sb-rich growth results in strain-relaxed islands mediated by misfit dislocation arrays, while group-III-rich conditions favor coherent Stranski–Krastanov growth. Interdiffusion during capping can further modify dot morphology, leading to ring-like structures and altered optical behavior.

These results highlight the role of epitaxial growth conditions, substrate orientation, and strain management in tailoring quantum dot structure and emission properties. The study provides insight into growth mechanisms enabling long-wavelength QDs and supports their integration into quantum photonic devices.

Epitaxial oxidation sequences in titanium and scandium nanoislands.
Pip Knight, Massachusetts Institute of Technology

Understanding epitaxial oxidation processes is crucial to many areas of nanoscience that require control of surface structure or utilize oxidation as a synthetic step to a final nanostructure. For example, in industrial chemical reactions catalyzed by metal nanoparticles, the surface structure of the catalytic nanoparticle depends on the gas environment and is crucial to surface catalytic activity¹. Meanwhile in microelectronics, oxidized metal seed layers are proposed to enable the growth of homogeneous gate

oxide films on challenging substrates like 2D materials², so controlling the phase and epitaxy of the oxide seed is essential for controlling these same properties of the film. However, detailed studies of epitaxial oxidation are challenging for more reactive metals because without an ultra-high vacuum (UHV) growth and imaging environment, it is not possible to capture the first stages of oxidation, such as suboxide formation. Furthermore, a detailed study of epitaxial oxidation sequences requires epitaxial, single crystalline metal as a starting material, ideally in a well-defined morphology.

In our work, we aim to understand the oxidation sequences of reactive metals. To do this, we grow flat, epitaxial nanoislands and films of the metals on suspended multilayer graphene (Gr) substrates to use as the starting point for oxidation studies. We focus on the hexagonal close-packed metals titanium (Ti) and scandium (Sc), which are both promising high k dielectric oxides for microelectronics^{3,4}. The metals are grown by electron beam deposition in UHV, then transferred in the same vacuum system to our UHV transmission electron microscope (TEM) where the phase transformations are conducted in situ. By making movies of the phase transformation, we can understand morphology changes and use in situ electron diffraction to track the formation of new crystallographic phases. We find that the sequence of daughter phases that form in each case are epitaxial, and we examine the crystallographic relationships between the sequence of suboxide phases to understand the atomic scale reaction pathway. We also indirectly probe the relative diffusivities of oxygen compared with the metal for each case by observing with in situ TEM whether the nanoscale Kirkendall effect occurs. Finally, we extend our study of in situ metal-gas reactions by discussing prospects for nitride formation reactions.

References:

1. Yokosawa, Tadahiro, Frans D. Tichelaar, and Henny W. Zandbergen. "In-Situ TEM on Epitaxial and Non-Epitaxial Oxidation of Pd and Reduction of PdO at $P= 0.2\text{--}0.7$ bar and $T= 20\text{--}650^\circ$ C." *European Journal of Inorganic Chemistry* 2016.19 (2016): 3094-3102.
2. Kim, Hoijoon, et al. "Ultrathin monolithic HfO₂ formed by Hf-seeded atomic layer deposition on MoS₂: Film characteristics and its transistor application." *Thin Solid Films* 673 (2019): 112-118.
3. Kim, Taikyu, et al. "Atomic layer growth of rutile TiO₂ films with ultrahigh dielectric constants via crystal orientation engineering." *ACS Applied Materials & Interfaces* 16.26 (2024): 33877-33884.
4. Lebedev, M. S., et al. "Optical properties and charge transport of textured Sc₂O₃ thin films obtained by atomic layer deposition." *Applied Surface Science* 478 (2019): 690-698.

Monday, June 8, 2026
9:00 – 11:40 Fundamentals of Crystallization I

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Monday, June 8, 2026
19:30 – 20:15 Plenary I

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Monday, June 8, 2026
20:20 – 21:10 Colloidal Crystallization I

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Tuesday, June 9, 2026

9:00 – 11:40 Artificial Intelligence & Machine Learning for Crystal Growth

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Tuesday, June 9, 2026
19:30 – 20:15 Plenary II

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Tuesday, June 9, 2026
20:20 – 21:10 Colloidal Crystallization II

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Wednesday, June 10, 2026
9:00 – 11:40 Biological & Biomimetic Materials

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Wednesday, June 10, 2026
19:30 – 21:10 Epitaxial Crystal Growth II

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Thursday, June 11, 2026
9:00 – 11:40 Fundamentals of Crystallization II

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