SCIENTIFIC PROGRAM

This virtual conference will feature three days of oral and poster presentations covering topics in the following areas:

Fundamentals of Crystal Growth

Chairs:
Boaz Pokroy
Israel Institute of Technology
bpokro@technion.ac.il

Invited Speakers

Maria Sushko
PNNL

James De Yoreo
PNNL

Peter Vekilov
University of Houston

Jeffrey Rimer
University of Houston

Modeling of Crystal Growth Processes

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

Invited Speakers

Jeff Derby
University of Minnesota

Lijun Liu
Xi'an Jiaotong University, China

Julia Dschemuchadse
Cornell University

Amish Patel
University of Pennsylvania

Baron Peters
University of Illinois

Chris Mundy
Pacific Northwest National Laboratory

Jeremy Palmer
University of Houston

Natasha Dropka
Leibniz Institute for Crystal Growth
Berlin, Germany

Chung-Wen Lan

National Taiwan University
Taipei, Taiwan

Bulk Crystal Growth

Chairs:
Aleksandar Ostrogorsky
Illinois Institute of Technology
aostrogo@iit.edu

Robert Feigelson
Stanford University
feigel@stanford.edu

Zhiqiang Mao
Pennsylvania State University

Andrew Novoselov
II-VI Aerospace & Defense

Biological and Biomimetic Materials

Chairs:
David Kisailus
UC Irvine
david.k@uci.edu

Jinhui Tao
Pacific Northwest National Laboratory
jinhui.tao@pnnl.gov

Atsushi Arakaki
Tokyo University of Agriculture and Technology
arakakia@cc.tuat.ac.jp

Description:
In this session, we will discuss crystallization of biological or biomimetic materials as well as self-assembly mechanisms. This includes, but will not be limited to: assembly and / or function of organic (e.g., polysaccharides, proteins, peptides, peptoids, polymers, DNA and RNA) materials, and nucleation, growth and phase transformations in biological or biomimetic materials as well as the subsequent impact on performance. In addition, interactions at the inorganic-organic interface, biomimetic crystallization and bioinspired syntheses as well as modeling of crystallization of biological structures and synthetic materials will be discussed. In this interdisciplinary session, state-of-the-art experimental procedures and theoretical approaches will be discussed and thereby further the understanding of fundamental principles as well as the possibilities for various applications.

Keynote Speakers:

Helmut Colfen (University of Konstanz, Germany)

Lara Estroff (Cornell University, USA)

Rajesh Naik (Air Force Research Lab, USA)

Invited Speakers:

Hermann Ehrlich (Technische Universitat, Freiberg, Germany)

Laurie Gower (University of Florida, USA)

Michiko Nemoto (Okayama University, Japan)

Fabio Nudelman (University of Edinburgh, UK)

Boaz Pokroy (Technion Institute of Technology, Israel)

Abe Satoshi (Tokyo Institute of Technology, Yokohama, Japan)

Ruikang Tang (Zhejiang University, China)

Takafumi Ueno (Tokyo Institute of Technology, Japan)

Kimberly Weirich (Clemson University, USA)

Dongfeng Xue (Chinese Academy of Sciences, Shenzhen, China)

Shuai Zhang (University of Washington)

Thin film growth, epitaxy, and superlattices

Chairs:
Ferdinand Scholz
University of Ulm, Germany
Ferdinand.Scholz@uni-ulm.de

Masakazu Sugiyama
University of Tokyo
sugiyama@ee.t.u-tokyo.ac.jp

Description:
This session will focus on recent experimental and theoretical developments as well as industrial applications in the epitaxial growth, structure, and properties of thin films. Topics of interest include kinetics and growth mechanisms, chemical reactions at surfaces, assembly at surfaces and interfaces, atomic layer deposition, nanostructured surfaces, ordering and phase transitions, as well as studies aimed at characterizing the optical, electronic, magnetic, and mechanical properties of thin films.

Invited Speakers:

Dr. Ewa Grzanka
Institute of High Pressure Physics, Polish Academy of Sciences Warsaw, Poland
"Studies towards InGaN QW homogenization and decomposition via metal vacancies"

Prof. Dr. Kimberly Dick Thelander
Centre for Analysis and Synthesis, NanoLund, Solid State Physics Lund University, Sweden
"Understanding the dynamics of III-V nanostructure growth with in-situ TEM"

Prof. Motoaki Iwaya
Meijo University, Nagoya, Japan
"MOVPE and in situ analysis for hetero-junctions, tunnel-junctions and DBRs"

Lattice-mismatched epitaxy and alternative epitaxial substrates

Chairs:
David Lackner
Fraunhofer ISE
David.Lackner@ise.fraunhofer.de

Description:
High quality (hetero-) epitaxy usually needs mono-crystalline substrates. The typical substrates, often from binary materials like GaAs, InP, InAs, GaSb or even Ge, cause severe constraints due to the limited choice of lattice constants, thermal misfit or simply because of cost. In this session, solutions to overcome these limitations by either engineered substrates or lattice mismatched (metamorphic) epitaxy shall be discussed. Ideally the epitaxy layer or device quality for growth on such engineered substrates or metamorphic buffers is presented.

Invited Speaker

Vladimir Tassev
Air Force Research Laboratory

2D materials, surfaces and interfaces

Symposium Chair: Kevin M. Daniels (University of Maryland) danielkm@umd.edu

Co-chairs: Cheng Gong (University of Maryland) and Soaram Kim (University of Maryland)

Description:
Research on the synthesis and the applications of various low-dimensional materials (0D, 1D, and layered 2D materials) are the themes of this symposium. These materials' unique properties, differing or exceeding those of their bulk crystal counterparts, are of potential scientific and technological importance. Materials of central importance to this symposium include 2D layered materials such as graphene, boron nitride, transition metal dichalcogenides and oxides, topological insulators superconductors, Xenes, etc., as well as their 0D and 1D counterparts and various heterostructural combinations. Due to widespread interest, a Special Topic Session on 2D magnetism is organized. Magnetism plays pivotal roles for a wide range of significant technologies such as data storage and biomedical imaging and continues to exhibit new phenomena in emerging materials at reduced dimensions. Magnetic 2D layered materials, experimentally discovered in 2017, are ideal platforms where both crystalline structural order and long-range magnetic order coexist in the atomic-thin region. The integration of 2D magnets with disparate electronic and photonic 2D materials opens up remarkable opportunities for designer quantum heterostructures with previously inaccessible magnetoelectric and magneto-optical properties. This Special Topic Session will collect abstracts on 2D magnet physics and modeling, various synthesis and characterization of 2D magnets and related heterostructures, and quantum transport and tunneling properties of 2D materials-based spintronic devices. This symposium aims to explore, through the contributions of leading researchers, new methodologies and breakthroughs in low-dimensional materials and identify constraining issues to future development.

List of invited speakers for the Symposium:
Jimmy Kotsakidis Monash University
Andrew May Oak Ridge National Laboratory
Angela Hight Walker National Institute of Standards and Technology
Matthias Batzill University of South Florida
Shoufeng Lan Texas A&M University
Xianglin Ke MICHIGAN STATE UNIVERSITY
Ziqiang Qiu UC Berkeley
Xi Ling Boston University
Liuyan Zhao University of Michigan
Paola Barbara Georgetown University
Petr Neugebauer CEITEC
Cheng Gong University of Maryland
Soaram Kim University of Maryland
Trevor Rhone Rensselaer Polytechnic Institute
Peter Sutter University of Nebraska-Lincoln

Nanocrystals, quantum dots, and nanowires

Chairs:
Jonathan Owen
Columbia University
jso2115@columbia.edu

Invited Speakers

Celso de Mello Donega

Benjamin Abecassis

Sanjit K. Ghose
BNL

David J. Norris
ETH Zurich

Sandrine Ithurria

Advanced Crystal Growth Technology and Equipment

Chairs:

Rajan Rengarajan
II-VI, Inc
rajan.rengarajan@ii-vi.com

Jeganathan Kulandaivel
Bharathidasan University
kjeganathan@bdu.ac.in

Description:
This symposium is open to all areas of crystal growth technolgy and equipment related to crystal growth. The contributions may include any type of crystals, any crystal growth technology, equipment related to crystal growth, epitaxial growth, processing, crystal characterization, and consumables related to crystal growth. Contributions are welcome from Academic Institutions, Research institutes, and Industries. Contributions may emphasize areas of repeatability, reliability, and sustainability. It welcomes talks from equipment manufacturers and suppliers involved in growth, processing, and diagnostics and from consumables suppliers. While the symposium is geared towards presentation by industrial speakers, researchers and engineers from universities and national laboratories who are presently in the early stages of technology transfer and development are highly encouraged to present in this symposium to showcase their innovations.

Invited Speakers

Danilo Crippa
LPE S.P.A
"A novel 200mm Silicon Carbide Epitaxial Reactor for Power Devices: equipment and process prospectives"

Siddha Pimputkar
Lehigh University
“Pushing the Boundary on Nitride-Synthesis Equipment Technology”

Dharmalingam Prabhakaran
Oxford University
“Synthesis and Discovery of Quantum Materials”

Nonlinear Optical and Laser Host Materials

Chairs:
Peter Schunemann
BAE Systems

Kevin Zawilski
BAE Systems

Description:
The Nonlinear Optical and Laser Host Materials symposium will focus on two related fields. The first concerns itself with the growth, properties, processing, and device performance of nonlinear optical materials. Topics include, but are not limited to, crystal growth methods, characterization and elimination of defects, enhancements in size, properties and performance, fabrication techniques, and new materials. Papers on both birefringent and quasi-phase-matched nonlinear optical crystals are welcome. The second field covered will focus on laser host materials. Areas of interest are advances in growth techniques for laser crystals and materials for diverse laser applications. Topics include, but are not limited to, new materials, mitigation of defect issues, and scaling in crystal size, power or performance of existing materials by improved growth techniques. Papers on both single crystal and polycrystalline laser host materials are welcome. Talks from all aspects of laser materials are encouraged, as well as results and advances in laser operation.

Invited Speakers

Eugenio Del Re
Univ of Rome-la Sapienza, Italy

Chunhui Yang
Harbin Institute of Technology, PR China

Benoît Boulanger
University Grenoble, FRANCE

Peter Schunemann
BAE Systems

Advanced OMVPE: novel materials and devices

Chairs:
Ryan Lewis
McMaster University
rlewis@mcmaster.ca

Description:
This session seeks participation from the broad OMVPE community: engineers focused on production issues and researchers developing new technology. This session will consider novel materials, as well as novel device applications of more established materials. We seek abstracts on materials growth, characterization, and how these efforts impact device realization and performance. We also seek abstracts describing the challenges facing industrial efforts and the solutions implemented.

Advanced OMVPE techniques: equipment, epitaxy, and characterization

Chairs:
Bernard Paquette
National Research Council, Canada

Description:
New improvements in crystal growth equipment, techniques, and characterization unlock new potential in terms of materials grown, their properties, as well as process control. This session focuses on recent developments in OMVPE that provide new capabilities in materials growth, monitoring of growth, or characterization of grown material, as well as improvements in material properties, measurement, or industrial application of OMVPE.

III-V Epitaxial Growth for Devices

Chairs:
Luke Mawst
University of Wisconsin-Madison

Nelson Tansu
The University of Adelaide, Australia
nelson.tansu@adelaide.edu.au

Description:
The III-V Epitaxial Growth for Devices symposium solicits papers on recent advances in the epitaxial growth of III-V materials for device application including; growth techniques for achieving novel device architectures or higher device performance levels, studies regarding the impact of material properties on device performance, device integration through growth, and the growth of emerging III-V materials for device applications.

Invited Speakers

Enrica Mura,
Tyndall National Institute, Ireland

Josh Brown
BluGlass Ltd, Australia

Kerstin Volz
Philipps-Universität Marburg,
Germany

III-V Wide Bandgap Nitride Semiconductors and Devices

Chairs:
Ramon Collazo
NC State University
rcollaz@ncsu.edu

Ronny Kirste
Adroit Materials Inc

ronny@adroitmaterials.com

Description:
III-V Nitride semiconductors have found widespread application in optoelectronics, power electronics, for detectors, and others. In this symposium, the growth of single crystal substrates, epitaxial layers and devices is discussed. The focus includes all aspects of fundamental and applied research related to nitride semiconductors.

Invited Speakers

Anthony Rice
Sandia National Laboratories, USA

Rafael Dalmau
HexaTech, Inc. USA

III-Vs on Silicon

Chairs:
Bill McMahon
National Renewable Energy Lab
Bill.mcmahon@nrel.gov

Description:
The growth of III-V compound semiconductors on silicon has long been a challenge and an opportunity. This symposium invites papers that deal with all areas of the formation of III-V's on silicon, including growth, characterization, simulation, stress management and device results. This session includes all III-V materials; arsenides, phosphides and nitrides.

Invited Speakers

Tyler Grassman
The Ohio State University

Thomas Hannappel
Technische Universität Ilmenau

Narrow Bandgap Semiconductors and Devices

Chairs:
Simon Watkins
Simon Fraser University
simonw@sfu.ca

Description:
Narrow gap materials are attracting increasing attention due to their applications in infrared emitters and detectors, particularly for remote sensing and security applications. This session will highlight the crystal growth of narrow bandgap materials as well as their device applications. Topics of interest include novel methods of crystal growth, novel materials, enhanced device functionality through bandgap engineering, advanced device designs, and other topics.

Invited Speakers

James Gupta
National Research Council of Canada

Sergey Suchalkin
Stony Brook University, Stony Brook, NY

Silicon Carbide and Gallium Oxide Materials and Devices

Chairs:
Govindhan Dhanaraj
Pallidus Inc
govindhan.dhanaraj@pallidus.com

Michael Dudley
Stony Brook University, Stony Brook, NY

Balaji Raghothamachar
Stony Brook University, Stony Brook, NY

Description:
Wide bandgap semiconductors silicon carbide and gallium oxide are being developed for power electronic applications. Silicon carbide technologies have been developed for more than 30 years and considered the mainstay in power electronics while gallium oxide has garnered considerable interest in recent years. The symposium will cover all aspects of the development of both materials and provide information on the state-of-the-art. Topics covered will include bulk and thin film growth; structural and point defect characterization; defect engineering techniques; growth chamber design and modeling; doping and carrier lifetime control techniques; power device structures and fabrication technologies; device characterization and modeling.

Invited Speakers

Zbigniew Galazka
LEIBNIZ-INSTITUT FÜR KRISTALLZÜCHTUNG, Germany

Victor Veliadis
Executive Director and CTO, Power America and NC State University

Roberto Fornari
Università di Parma, Italy

Elif Balkas
Wolfspeed, USA

Andrew Allerman
Sandia

Allen Brady

Alex Galyukov
STR US, Inc.

Materials for photovoltaics and other energy technologies

Chairs:
John Geisz
National Renewable Energy Lab
John.geisz@nrel.gov

Description:
This session focuses on the growth of crystalline materials for photovoltaics and other energy technologies, such as thermoelectrics and piezoelectric. Single- and poly-crystalline silicon devices currently dominate the rapidly growing photovoltaic industry, but perovskite, CdTe, CIGS, earth abundant thin films and high efficiency III-V solar cells are emerging materials for cost effective power generation. Novel materials and devices for power generation are encouraged topics for this session.

Invited Speakers

David Lackner
Fraunhofer Institute for Solar Energy Systems ISE
Freiburg, BW, Germany

Mohan Narayanan
Clean Energy Associates
Denver, CO

Parthiv Daggolu
Leading Edge Equipment Technologies

Wilmington, Massachusetts

Eric Colegrove
NREL

Characterization techniques for bulk and epitaxial crystallization

Chairs:
Michael Dudley
Stony Brook University
Michael.Dudley@stonybrook.edu

Xianrong Huang
Advanced Photon Source
Argonne National Laboratory, USA

Sakiko Kawanishi
Tohoku University, Japan

Maria Tsoutsouva
Norwegian University of Science and Technology, Norway.

Researchers from around the world will gather at this virtual event to be held as part of the 22nd American Conference on Crystal Growth and Epitaxy (ACCGE-22) and 20th US Workshop on Organometallic Vapor Phase Epitaxy (OMVPE-20) (https://www.crystalgrowthconference2021.org/) which will be an online conference held August 2-4, 2021 to share research with their colleagues who are actively engaged in advances in characterization techniques relevant to bulk and epitaxial crystallization. This symposium features presentations addressing issues of current and future interest, covering both theoretical and experimental work. Topics to be covered include advances in the understanding of the origin of defects in crystals, their behavior during and after the growth process and the influence of these defects on the performance of the particular intended device application. Featured will be presentations about state-of-the-art developments and applications where the complex nature of materials is recognized. Additionally, discussions are anticipated on the applications and possibilities for multi-technique measurements of interdependent parameters and the evaluation of the data through sophisticated computer analyses.

Invited Speakers

Takeshi Yoshikawa
University of Tokyo, Japan

Fumihiro Fujie
Nagoya University, Japan

Jaime Frietas, Jr.
NRL, USA

Sage Bauers
NREL, USA

Nadeemullah Mahadik
NRL USA

Christian Reimann
Fraunhofer Inst., Germany

Symposia focusing on hot issues of the science and practice of crystal growth:

Symposium on Twisted Crystals

Chairs:
Bart Kahr
New York University

bart.kahr@nyu.edu

Description:

Invited Speakers

Stephanie Lee
NYU

David Amabilino
U. Nottingham

Willem Noorduin
AMOLF Amsterdam

Eli Sutter
University of Nebraska-Lincoln

Yuzhou Zhao
PhD Student U. Wisconsin

Symposium on Metal Nanoparticle Nucleation and Growth

Chairs:
Hong Yang

Invited Speakers

Ou Chen
Brown University (USA)

Hongyou Fan
Sandia National Lab

Sara Skrabalak
Indiana University

Jianping Xie
National University of Singapore

Symposium on Nucleation and Growth in Microfluidics

Chairs:

Stéphane Veesler
CINaM
veesler@cinam.univ-mrs.fr

Nadine Candoni
CINaM
candoni@cinam.univ-mrs.fr

Romain Grossier
CINaM
grossier@cinam.univ-mrs.fr

Description:
This last decade, microfluidics technology has proved its efficiency to study crystallization fundamentals in chemistry and biology. This symposium will give an opportunity to the crystal growth community to present and discuss about the latest advances in this field of research. Presentations and discussions will focus on experimental and theoretical aspect of phase separation and crystal growth studies.

Invited Speakers

Simon Kuhn
KU Leuven
Leuven, Belgium

Charline Gerard
Technologie Servier
Orléans, France

Third Symposium on Ferroelectric Crystals and Textured Ceramics

Chairs:
Zuo-Guang Ye
Simon Fraser University
zye@sfu.ca

Shujun Zhang
University of Wollongong, Australia

Invited Speakers

Yunfei Chang
Harbin Institute of Technology, China

Sandy Cochran
University of Glasgow, UK

Lynn Ewart
Naval Undersea Warfare Center, USA

Peter Kabakov
University of Wollongong, Australia

Ho-Yong Lee
Ceracomp Inc., South Korea

Fei Li
Xi'an Jiaotong University, China

Yuji Noguchi
Kumamoto University
Kumamoto, Japan

Fifth Symposium on 2D and Low Dimensional Materials

Symposium Chair: Kevin M. Daniels (University of Maryland) danielkm@umd.edu
Co-chairs: Cheng Gong (University of Maryland) and Soaram Kim (University of Maryland)

Boron Nitride Epitaxial Growth and Characterization Symposium

Chairs:
Siddha Pimputkar
Lehigh University
siddha@lehigh.edu

James Edgar
Kansas State University
edgarjh@k-state.edu

Description:
Boron nitride (BN) has recently emerged as a material of choice for a wide array of technologically important application areas including deep-UV optoelectronics, power/RF electronics, neutron detectors, single photon/electron emitters, and super-capacitors. BN exists in three different crystalline forms: hexagonal, cubic and wurtzite resulting in a wide range of material properties, quite in analogy to carbon taking on a wide range of extreme properties resulting from structures ranging from diamond to graphite to graphene. Despite BN's exciting material properties, the full potential of BN has yet to be realized at scale

due to challenges in its large area, high quality, reliable synthesis in the desired polymorph. A lack of native substrates requires sophisticated approaches to overcome challenges brought on by heteroepitaxial constraints. This symposium explores recent advances in boron nitride synthesis (all polymorphs) with a particular focus on its epitaxial growth. Resulting material properties and defects will be discussed along with general characterization of this material and determination of metrics to assess 'quality' of synthesized materials.

Invited Speakers

Ishwara B. Bhat
Rensselaer Polytechnic Institute, USA, https://www.ecse.rpi.edu/people/faculty/ishwara-b-bhat
"Properties of Hexagonal Boron Nitride Grown on Sapphire and Silicon Substrates"

Jianlin Liu
University of California, Riverside, USA, https://profiles.ucr.edu/app/home/profile/jianlin
"Two-dimensional hexagonal boron nitride: from molecular beam epitaxial growth to devices"

Sergei Novikov
University of Nottingham, UK, https://www.nottingham.ac.uk/physics/people/sergei.novikov
"High-temperature MBE of hBN for single-photon emitters, deep-ultraviolet and lateral heterostructures."

Michael Snure
Air Force Research Lab, USA, https://www.spiedigitallibrary.org/profile/Michael.Snure-4198251
"Development of CVD grown hBN for scalable 2D electronics"

Takashi Taniguchi
International Center for Materials Nanoarchitectonics (NIMS), Japan,
https://samurai.nims.go.jp/profiles/taniguchi_takashi?locale=en
"Synthesis of BN crystals by using solvent growth and their defect characterization"

Symposium on Detector Materials: Scintillators and Semiconductors

Chairs:
Henry Chen
Brimrose Corporation
hchen@brimrose.com

Ei Ei Brown
US DEVCOM Army Research Laboratory
eiei.brown.civ@mail.mil

Description:
The past decades have seen extraordinary advances in materials science and engineering, cutting across the full range of materials classes. Many of these developments have been generally driven by nanotechnology as well as materials for quantum information, computational materials science, and green energy. While world attention has been focusing on these new emerging fields, one area that seems to under-receive the attention is detector materials, despite impressive breakthroughs have been continuously produced in various classes of materials in the field of radiation detection technologies.

This symposium seeks to share and advance the latest developments in scintillators and semiconductors, the two major nuclear radiation detector materials that have continuously grown, in multifold rate in the last 20 years, driven mainly by high applications demands in the fields of medical imaging and applications (SPECT, TOF-PET, PCCT…), homeland security, as well as scientific research (high energy physics, planetary science…). In fact, the applications of solid-state detector materials, both semiconductors and scintillators, encompass not just ionizing radiations (x-rays, gamma-rays, particles) but also non-ionizing radiations (infrared, THz…) and thus will be covered by this symposium. The symposium also seeks to cover advances in crystal growth, characterization, and device performance of new detector materials such as hybrid materials (e.g., perovskites), composite materials like nanocomposite scintillators as well as other novelties. A special session will also be organized for attendees to bring up issues for shared discussions, along with other topics of relevance to the audience.

Invited Speakers

R. Radhakrishnan Sumathi
Leibniz-Institute
Berlin, Germany

Irfan Kuvvetli
Technical University of Denmark
Kgs Lyngby, Denmark

Shariar Motakef
CapeSym

Kevin Pritchard
National Institute of Standards and Technology

Luis Stand
University of Tennessee - Knoxville

Krishna C. Mandal
University of South Carolina, Columbia
“High-resolution nuclear radiation detectors on 4H-SiC epitaxial layers”

Mark Derzon
Gold Standard Radiation Detection, Inc.,
“Suggested Material and Semiconductor Research to Improve Detectors for National Security and Civil Defense”

Rastgo Hawrami
Fisk University
“Latest Development on Advanced Tl-based Scintillator Crystals for Radiation Detection and Medical Imaging”

Elsa Ariesanti
Fisk University
“Advanced Inorganic Halide Ceramic Scintillators.”

Henry Chen
Brimrose Technology Corp.
“Mercurous Bromine Hg2Br2 as the next generation scintillator for space mission, high energy physics, defense and security applications”