REPORT DOCUMENTATION PAGE

Form Approved OMB NO. 0704-0188

1. REPORT DATE (DD-MM-YYYY)	2. REPORT TYPE	3. DATES COVERED (From - To)
19-12-2022	Final Report	1-Mar-2022 - 31-Oct-2022

4. TITLE AND SUBTITLE
Final Report: 2022 Solid State Studies in Ceramics Gordon Research Conference and Seminar

5a. CONTRACT NUMBER
W911NF-22-1-0017

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER
611102

6. AUTHORS

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAMES AND ADDRESSES
Gordon Research Conferences, Inc.
512 Liberty Lane

West Kingston, RI 02892 -1502

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS (ES)
U.S. Army Research Office
P.O. Box 12211
Research Triangle Park, NC 27709-2211

10. SPONSOR/MONITOR'S ACRONYM(S)
ARO

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
80206-SM-CF.1

12. DISTRIBUTION AVAILIBILITY STATEMENT
Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES
The views, opinions and/or findings contained in this report are those of the author(s) and should not contrued as an official Department of the Army position, policy or decision, unless so designated by other documentation.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	15. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Ivar Reimanis
UU	UU	UU	UU		19b. TELEPHONE NUMBER 303-273-3549

RPPR Final Report
as of 19-Dec-2022

Agency Code: 21XD

Proposal Number: 80206SMCF **Agreement Number: W911NF-22-1-0017**
INVESTIGATOR(S):

Name: Ph.D. Ivar E. Reimanis
Email: reimanis@mines.edu
Phone Number: 3032733549
Principal: Y

Organization: **Gordon Research Conferences, Inc.**
Address: 512 Liberty Lane, West Kingston, RI 028921502
Country: USA
DUNS Number: 075712877 EIN: 050300482

Report Date: 31-Jan-2023 Date Received: 19-Dec-2022
Final Report for Period Beginning 01-Mar-2022 and Ending 31-Oct-2022
Title: 2022 Solid State Studies in Ceramics Gordon Research Conference and Seminar
Begin Performance Period: 01-Mar-2022 **End Performance Period:** 31-Oct-2022
Report Term: 0-Other

Submitted By: Ph.D. Nancy Gray Email: grants@grc.org
Phone: (401) 742-8826

STEM Degrees: **STEM Participants:**

Major Goals: The conference will be held in South Hadley, MA August 7 - 12, 2022. An associated conference designed for students and postdocs is the Gordon Research Seminar held August 6 - 8, 2022, immediately preceding the GRC. The purpose of the conference and seminar is to bring world experts together to discuss the forefront of ceramics research and to expose graduate students and early career professionals to the latest findings in the topical areas described in the proposal. The overall theme and the specific topics covered in this GRC are of direct relevance to the Army because they connect directly to the development of new materials with exceptional and even unprecedented behaviors. In particular, the conference will have a strong focus on mechanical behavior of materials, including the coupling between various physical phenomena (mechanical, thermal, chemical, electrical, magnetic, or optical), to generate new responses. Insight provided through the study of coupled, multiphysical phenomena at the atomistic and nanometer scales ultimately enables the design of materials with desired properties and behaviors.

Accomplishments: Many of the most interesting and technologically relevant properties of ceramics derive from coupled phenomena (mechanical, thermal, chemical, electrical, magnetic, optical) that originate at the atomistic and nanometer length scales. The complex behavior of ceramics under extreme conditions and/or away from equilibrium leads, on the one hand, to challenges in deciphering behavioral mechanisms, and on the other, opportunities to create ceramics with unprecedented properties. A wide variety of experimental and theoretical tools have recently emerged to reveal multiphysical, multiscale mechanisms that govern material behavior during processing and service. These specifically include the emergence of data driven atomistic and mesocontinuum computational modeling approaches, novel in situ experiments, and measurements under extreme conditions.

This conference was the latest in the series of highly successful GRCs on Solid State Studies in Ceramics that started in 1954. It examined the above issues in structural and functional ceramics. Topics included, among others, additive manufacturing, accelerated materials discovery, the behavior of hierarchical materials, understanding thermal-mechanical response under extreme conditions, in situ experiments (including transmission electron microscopy), coupled phenomena during processing and service, and fundamental studies in perovskites.

Participants in the conference experienced a stimulating and diverse environment in which they discussed the forefront of ceramics science and engineering. Students and young professionals enjoyed opportunities to interact with experts in the field during the oral presentations as well as the evening poster sessions. The discussion sessions were structured to identify both challenges and opportunities in the discipline. A Power Hour was organized to promote the inclusion and professional development of women and underrepresented minorities in ceramics research. The accompanying Gordon Research Seminar (GRS) offered additional career development

and networking opportunities for students and young researchers.

The Solid State Studies in Ceramics Gordon Research Seminar (GRS) offered a unique opportunity for graduate students, post-docs and other young scientists to engage in a vibrant scientific exchange of knowledge in the field of ceramics. Being the third Solid State Studies in Ceramics GRS, the 2022 meeting, "Fundamental Phenomena in Ceramics from the Atomistic Level to the Microstructure", allowed the young scientific generation to present and share current work in a unique and informal atmosphere.

The seminar engaged in two complementary aspects of cutting-edge research in ceramic materials; microstructure and atomistic level characterization. These two were brought together to offer new insights as for what arises when the two are combined. The seminar included a broad range of topics at the macroscopic level as well as application derived research. In addition, advanced characterization methods utilized to provide fundamental understanding of phenomena at the atomistic level were presented. The multiscale approach allowed attendees to investigate the effects of ceramics science done at the atomistic scale on the microstructure and ceramic properties, with the goal of gaining the ability to tailor specific designed properties.

The seminar consisted of talks, poster sessions and a career panel which gave researchers at different early career stages new insights into planning their career ahead. The GRS included a diverse audience from multiple countries, areas of expertise and career directions (academia, industry and national labs).

Training Opportunities: Speakers, discussion leaders, poster presenters and attendees simultaneously contributed to and benefited from the collective skills and experience shared throughout the conference.

Results Dissemination: The final program has been posted on the GRC website.

Honors and Awards: Nothing to Report

Protocol Activity Status:

Technology Transfer: Nothing to Report

Partners

,

I certify that the information in the report is complete and accurate:
Signature: Darlene Armstrong
Signature Date: 12/19/22 12:33PM

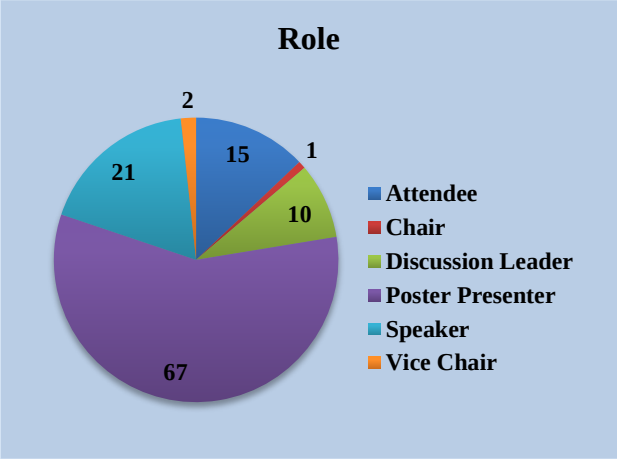
GORDON RESEARCH CONFERENCES
FINAL REPORT
US Army Research Office
Solid State Studies in Ceramics GRC/GRS
Grant Number W911NF2210017

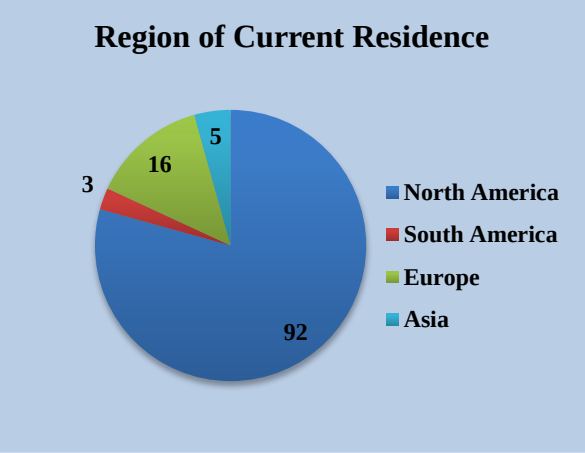
Operational Summary

The Gordon Research Conference (GRC) and Gordon Research Seminar (GRS) on Solid State Studies in Ceramics were held at Mount Holyoke College in South Hadley, Massachusetts from August 6-12, 2022. The meeting covered a variety of scientific topics and the content presented was highly rated by participants.

Conference Participants

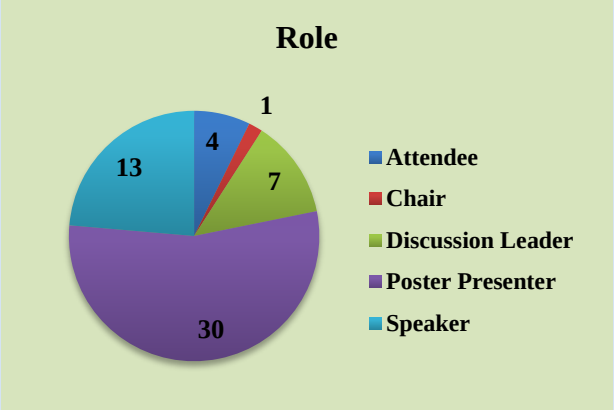
The Conference was well-attended with 116 participants. Scientists from academia represented 87% of the participants while attendees from government accounted for 7% and those from industry totaled 6%. The meeting also attracted a strong mix of young investigators and senior scientists. Students and post-docs accounted for 47% of all attendees. Approximately 33% of the participants at the 2022 meeting were women.

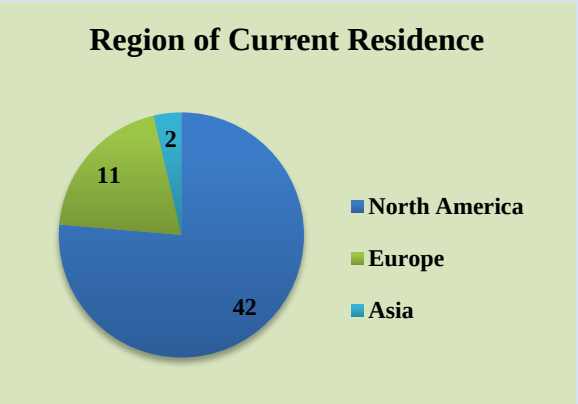




Seminar Participants

The Seminar was well-attended with 55 participants. Students and post docs combined accounted for 87% of all attendees. Approximately 35% of the participants at the 2022 seminar were women.





Conference Program

Many of the most interesting and technologically relevant properties of ceramics derive from coupled phenomena (mechanical, thermal, chemical, electrical, magnetic, optical) that originate at the atomistic and nanometer length scales. The complex behavior of ceramics under extreme conditions and/or away from equilibrium leads, on the one hand, to challenges in deciphering behavioral mechanisms, and on the other, opportunities to create ceramics with unprecedented properties. A wide variety of experimental and theoretical tools have recently emerged to reveal multiphysical, multiscale mechanisms that govern material behavior during processing and service. These

specifically include the emergence of data driven atomistic and mesocontinuum computational modeling approaches, novel *in situ* experiments, and measurements under extreme conditions.

This conference was the latest in the series of highly successful GRCs on Solid State Studies in Ceramics that started in 1954. It examined the above issues in structural and functional ceramics. Topics included, among others, additive manufacturing, accelerated materials discovery, the behavior of hierarchical materials, understanding thermal-mechanical response under extreme conditions, *in situ* experiments (including transmission electron microscopy), coupled phenomena during processing and service, and fundamental studies in perovskites.

Participants in the conference experienced a stimulating and diverse environment in which they discussed the forefront of ceramics science and engineering. Students and young professionals enjoyed opportunities to interact with experts in the field during the oral presentations as well as the evening poster sessions. The discussion sessions were structured to identify both challenges and opportunities in the discipline. A Power Hour was organized to promote the inclusion and professional development of women and underrepresented minorities in ceramics research. The accompanying Gordon Research Seminar (GRS) offered additional career development and networking opportunities for students and young researchers.

The Solid State Studies in Ceramics Gordon Research Seminar (GRS) offered a unique opportunity for graduate students, post-docs and other young scientists to engage in a vibrant scientific exchange of knowledge in the field of ceramics. Being the third Solid State Studies in Ceramics GRS, the 2022 meeting, "Fundamental Phenomena in Ceramics from the Atomistic Level to the Microstructure", allowed the young scientific generation to present and share current work in a unique and informal atmosphere.

The seminar engaged in two complementary aspects of cutting-edge research in ceramic materials; microstructure and atomistic level characterization. These two were brought together to offer new insights as for what arises when the two are combined. The seminar included a broad range of topics at the macroscopic level as well as application derived research. In addition, advanced characterization methods utilized to provide fundamental understanding of phenomena at the atomistic level were presented. The multiscale approach allowed attendees to investigate the effects of ceramics science done at the atomistic scale on the microstructure and ceramic properties, with the goal of gaining the ability to tailor specific designed properties.

The seminar consisted of talks, poster sessions and a career panel which gave researchers at different early career stages new insights into planning their career ahead. The GRS included a diverse audience from multiple countries, areas of expertise and career directions (academia, industry and national labs).

Conference Budget

Funding provided by the US Army Research Office supported partial registration and/or travel for 7 postdocs, 5 assistant professors, 31 graduate students and 1 research scientists at the GRC and27 graduate students, 1 professor and 7 postdocs at the GRS.

Conference Feedback

Participants had an opportunity to provide feedback at the end of the Conference. The feedback collected from the meeting was extremely positive. Evaluations included numerous positive remarks including great diversity between speakers and attendees, great power hour and the new and interesting topics. Evaluations from the GRS included positive comments regarding stimulating and engaging discussions, diverse speaker pool and networking opportunities.

GRC would like to thank the US Army Research Office for its continued support of the meetings. The contributions received have been critical to the success of the conferences and are having a measurable impact in advancing the frontiers of science worldwide.

Dr. Ivar Reimanis, GRC Chair
Colorado School of Mines

Dr. Edwin Garcia, GRC Vice Chair
Purdue University

Dr. Wayne Kaplan, GRC Vice Chair
Technion – Israel Institute of Technology

Dr. Jasmin Koldehoff, GRS Chair
Hamburg University of Technology

Dr. Hadas Sternlicht, GRS Chair
National Center for Electron Microscopy,
Lawrence Berkeley National Laboratory

Dr. Nancy Ryan Gray
President and Chief Executive Officer

Gordon Research Conferences

Solid State Studies in Ceramics

Gordon Research Conference

Coupled Phenomena in Ceramics Across Length Scales

August 7 - 12, 2022

Chair Ivar E. Reimanis

Vice Chairs Wayne D. Kaplan and Edwin Garcia

Mount Holyoke College

50 College Street

South Hadley, MA, United States

Conference Program

Sunday

2:00 pm - 9:00 pm	Arrival and Check-in
6:00 pm - 7:00 pm	Dinner
7:30 pm - 7:40 pm	Introductory Comments by GRC Site Staff / Welcome from the GRC Chair
7:40 pm - 9:30 pm	**Achieving Exceptional Responses in Structural Materials** Discussion Leader: **Brian Cox** (Gentleman Scientist, United States)
7:40 pm - 8:20 pm	**Julia Greer** (California Institute of Technology, United States) "Materials by Design: Three-Dimensional Nano-Architected Meta-Materials"
8:20 pm - 8:35 pm	Discussion
8:35 pm - 9:15 pm	**Kevin Hemker** (Johns Hopkins University, United States) "Understanding and Mitigating Amorphization to Improve the Ballistic Performance of Boron Carbide"
9:15 pm - 9:30 pm	Discussion

Monday

7:30 am - 8:30 am	Breakfast
8:30 am - 9:00 am	Group Photo
9:00 am - 12:30 pm	**Thermo-Mechanical Behavior in Extreme Environments** Discussion Leader: **William Fahrenholtz** (Missouri University of Science and Technology, United States)
9:00 am - 9:40 am	**Alexandra Navrotsky** (Arizona State University, United States) "High Entropy Oxides - Order Competes with Randomness"
9:40 am - 10:00 am	Discussion
10:00 am - 10:30 am	Coffee Break
10:30 am - 11:10 am	**David Poerschke** (University of Minnesota, United States)

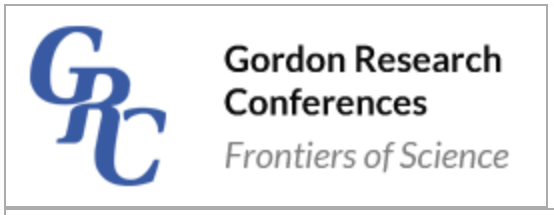
	"New Strategies to Understand Oxidation Processes in Heterogeneous, Non-oxide Ceramic Composites"
11:10 am - 11:30 am	Discussion
11:30 am - 12:10 pm	**Frank Zok** (University of California, Santa Barbara, United States) "Tensile Response of SiC/SiC Composites: Fragmentation, Sliding, and Interface Degradation"
12:10 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
3:00 pm - 4:00 pm	**The GRC Power Hour™** *The GRC Power Hour™ is designed to address diversity and inclusion in the scientific workplace by providing a safe environment for informal and meaningful conversations amongst colleagues of all career stages. The program supports the professional growth of all members of our communities, including ethnicity, race and/or gender identity by providing an open forum for discussion and mentoring.* Organizer: **Corinne Packard** (Colorado School of Mines, United States)
4:00 pm - 6:00 pm	**Poster Session**
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	**Processing Complex Structures** Discussion Leader: **Lisa Rueschhoff** (AFRL, United States)
7:30 pm - 8:10 pm	**Mark O'Masta** (HRL Laboratories, LLC, United States) "Additive Manufacturing of Reinforced Polymer Derived Ceramics"
8:10 pm - 8:30 pm	Discussion
8:30 pm - 9:10 pm	**Edson Roberto Leite** (Centro Nacional de Pesquisa em Energia e Materiais (CNPEM), Brazil) "Visualization of the Sintering and Desintering in Nanoceramics with Atomic Resolution"
9:10 pm - 9:30 pm	Discussion
Tuesday	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	**Interfaces and Grain Boundaries** Discussion Leader: **Fadi Abdeljawad** (Clemson University, United States)
9:00 am - 9:40 am	**Yuichi Ikuhara** (University of Tokyo, Japan) "Atomistic Dynamics of Deformation, Fracture and GB Migration in Ceramics"

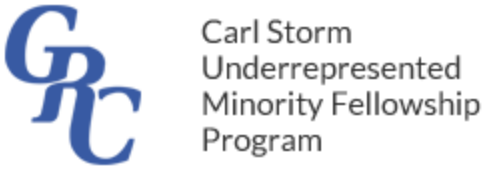
9:40 am - 10:00 am	Discussion
10:00 am - 10:30 am	Coffee Break
10:30 am - 11:10 am	**Amanda Krause** (University of Florida, United States) "Capturing Unexplained Grain Growth Behavior by 4D X-ray Diffraction Microscopy"
11:10 am - 11:30 am	Discussion
11:30 am - 12:10 pm	**Timofey Frolov** (LLNL, United States) "Modeling Grain Boundary Mediated Plasticity with Massively Parallel Atomistic Simulations"
12:10 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	**Poster Session**
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	**Defects in Ceramics** Discussion Leader: **Nasim Alem** (Penn State University, United States)
7:30 pm - 8:10 pm	**William Bowman** (University of California, Irvine, United States) "Defect Segregation and Electrical Conductivity of Oxide Grain Boundaries Studied with Multiscale Synthesis and Characterization"
8:10 pm - 8:30 pm	Discussion
8:30 pm - 9:10 pm	**Elizabeth Dickey** (Carnegie Mellon University, United States) "Point Defects and Lattice Disorder in Electronic Ceramics"
9:10 pm - 9:30 pm	Discussion
Wednesday	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	**Interfaces and Electrical Charge** Discussion Leader: **Sossina Haile** (Northwestern University, United States)
9:00 am - 9:40 am	**Wolfgang Rheinheimer** (Forschungszentrum Jülich, Germany) "Interplay of Defects and Microstructure Evolution in Perovskites"
9:40 am - 10:00 am	Discussion
10:00 am - 10:30 am	Coffee Break
10:30 am - 11:10 am	**Klaus van Benthem** (University of California, Davis, United States)

	"Stressing Surfaces and Interfaces to Change Microstructure"
11:10 am - 11:30 am	Discussion
11:30 am - 12:10 pm	**Jian Luo** (University of California, San Diego, United States) "Electric Fields and Electrochemically Controlled Microstructural Evolution"
12:10 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	**Poster Session**
6:00 pm - 7:00 pm	Dinner
7:00 pm - 7:30 pm	**Business Meeting** *Nominations for the Next Vice Chair(s); Complete the GRC Evaluation Forms; Discuss Future Dates and Venue; Election of the Next Vice Chair(s)*
7:30 pm - 9:30 pm	**Coupled Phenomena in Oxides** Discussion Leader: **Kelsey Hatzell** (Princeton University, United States)
7:30 pm - 8:10 pm	**Nicola Perry** (University of Illinois Urbana-Champaign, United States) "Chemo-mechanical Coupling in Mixed Conducting Perovskite Oxides"
8:10 pm - 8:30 pm	Discussion
8:30 pm - 9:10 pm	**Ange-Therese Akono** (Northwestern University, United States) "Influence of Carbon-based Nanomaterials on Fracture Response of Geopolymers"
9:10 pm - 9:30 pm	Discussion
Thursday	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	**Perovskites for Optoelectronics** Discussion Leader: **Bryan Huey** (University of Connecticut, United States)
9:00 am - 9:40 am	**David Cahen** (Weizmann Inst. of Science & Bar-Ilan Univ., Israel) "(Halide) Perovskites Beyond PV: A New Window on Sustainable Electronic Materials?"
9:40 am - 10:00 am	Discussion
10:00 am - 10:30 am	Coffee Break
10:30 am - 11:10 am	**Diana Qiu** (Yale University, United States) "Many-Body Effects on the Electronic and Optical Properties of Halide Perovskites: the Role of Dimensionality, Chemical Composition and Disorder"

11:10 am - 11:30 am	Discussion
11:30 am - 12:10 pm	**Ricardo Castro** (University of California at Davis, United States) "Understanding Grain Growth Control Through an Experimental Thermo-Kinetic Analysis"
12:10 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	**Poster Session**
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	**Late Breaking Topics and Biological Materials in the Extreme** Discussion Leader: **Olivia Graeve** (University of California, San Diego, United States)
7:30 pm - 8:10 pm	**David Kisailus** (University of California, Irvine, United States) "Biological Blueprints Towards Next Generation Multifunctional Materials"
8:10 pm - 8:30 pm	Discussion
8:30 pm - 8:40 pm	**Bryan Conry** (University of Florida, United States) "Engineering Grain Boundary Anisotropy to Suppress Abnormal Grain Growth in Alumina"
8:40 pm - 8:45 pm	Discussion
8:45 pm - 8:55 pm	**Rebecca Gallivan** (California Institute of Technology, United States) "On the Cusp of Continuum: Microstructural Origins of the Emergent Electromechanical Behavior in Nanocrystalline Nano-architected Zinc Oxide"
8:55 pm - 9:00 pm	Discussion
9:00 pm - 9:10 pm	**Scott Misture** (Alfred University, United States) "Selective Reduction of Transition Metals from Spinel Oxides: Surface Mass Transport"
9:10 pm - 9:15 pm	Discussion
9:15 pm - 9:25 pm	**Lukas Porz** (Technical University of Darmstadt, Germany) "Blacklight Sintering - a Novel Approach to Rapid Densification of Ceramics"
9:25 pm - 9:30 pm	Discussion
Friday	
7:30 am - 8:30 am	Breakfast
9:00 am	Departure

Contributors






GE Research


Support for this event was provided, in part, by National Institute of Standards and Technology financial assistance award 60NANB20D010.

This material is based upon work supported by the Air Force Office of Scientific Research under award number FA9550-20-1-0022. Any opinions, finding, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the United States Air Force.

Solid State Studies in Ceramics (GRS)
Gordon Research Seminar
Fundamental Phenomena in Ceramics from the Atomistic Level to the Microstructure
August 6 - 7, 2022
Chairs Hadas Sternlicht and Jasmin Koldehoff
Mount Holyoke College
50 College Street
South Hadley, MA, United States

Conference Program

Saturday

1:00 pm - 5:00 pm	Arrival and Check-in
3:30 pm - 3:45 pm	Introductory Comments by GRC Site Staff / Welcome from the GRS Chair
3:45 pm - 4:30 pm	**Advances in Characterization Techniques of Ceramics at the Atomistic Level** Discussion Leader: **John Blendell** (Purdue University, United States)
3:45 pm - 4:10 pm	**Colin Ophus** (Lawrence Berkeley National Laboratory, United States) "Atomic-Scale Characterization of Ceramic Materials with Four Dimensional Scanning Transmission Electron Microscopy"
4:10 pm - 4:15 pm	Discussion
4:15 pm - 4:25 pm	**Stephen Funni** (Carnegie Mellon University, United States) "Quantifying Local-to-Mesoscale Structural Correlations in Relaxor Ferroelectrics via High Resolution STEM"
4:25 pm - 4:30 pm	Discussion
4:30 pm - 6:00 pm	**Poster Session**
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	**Approaches in Microstructure Evolution and Processing of Ceramics** Discussion Leaders: **Dalton Cox** (Northwestern University, United States) and **Steven Rizzie** (University of California, Santa Barbara, United States)
7:30 pm - 7:45 pm	**Lukas Porz** (Technical University of Darmstadt, Germany) "Blacklight Sintering - a Novel Approach to Rapid Densification of Ceramics"
7:45 pm - 7:50 pm	Discussion
7:50 pm - 8:05 pm	**Iva Milisavljevic** (Alfred University, United States) "The Effects of Sintering Additives and Parameters on the Solid-State Single-Crystal Growth of YAG"
8:05 pm - 8:10 pm	Discussion
8:10 pm - 8:25 pm	**Maged Abdelsamie** (Lawrence Berkeley National Laboratory, United States)

	"In-situ Investigation of Crystallization Pathways in Sol-Gel Synthesis of Multiferroic Bismuth Ferrite Thin Films"
8:25 pm - 8:30 pm	Discussion
8:30 pm - 8:45 pm	**Andrew Ericks** (University of California, Santa Barbara, United States) "Protocol for Selecting Exemplary Silicate Deposit Compositions for Evaluating Thermal and Environmental Barrier Coatings"
8:45 pm - 8:50 pm	Discussion
8:50 pm - 9:05 pm	**Andrew Martin** (Lawrence Berkeley National Laboratory, United States) "Investigation on Thermochemical Salt Hydrates Behavior in the Particle Level for High Energy Density Thermal Storage"
9:05 pm - 9:10 pm	Discussion
9:10 pm - 9:25 pm	**Alexander Plunkett** (Hamburg University of Technology, Germany) "Robust, Multifunctional, Ceramic Nanocomposites via Tuned Interfaces in Supercrystalline Materials"
9:25 pm - 9:30 pm	Discussion
Sunday	
7:30 am - 8:30 am	Breakfast
9:00 am - 11:00 am	**Interfaces and Defects in Ceramics** Discussion Leaders: **Bryan Conry** (University of Florida, United States) and **William Bowman** (University of California, Irvine, United States)
9:00 am - 9:20 am	**Moritz Kindelmann** (Forschungszentrum Jülich, Germany) "Interface Characterization of Cold Sintered $BaZr_{0.7}Ce_{0.2}Y_{0.1}O_{3-d}$ Perovskite Membranes"
9:20 am - 9:30 am	Discussion
9:30 am - 9:50 am	**Till Froemling** (Technical University of Darmstadt, Germany) "Tailoring Ceramic Functional Properties with Dislocations"
9:50 am - 10:00 am	Discussion
10:00 am - 10:15 am	**Dylan Jennings** (Forschungszentrum Jülich, Germany) "Scanning Transmission Electron Microscopy Studies of Segregation Behavior in Iron Doped Strontium Titanate"
10:15 am - 10:20 am	Discussion
10:20 am - 10:35 am	**Jiayue Wang** (Massachusetts Institute of Technology, United States) "Exsolution-Driven Surface Transformation in the Host Oxide"

10:35 am - 10:40 am	Discussion
10:40 am - 10:55 am	**Shivani Srivastava** (University of California Berkeley, United States) "Influence of Local Charge and Magnetic Ordering on Point Defect Properties in Magnetite (Fe_3O_4)"
10:55 am - 11:00 am	Discussion
11:00 am - 12:30 pm	**Poster Session** *Coffee will be served in the poster area from 11:00 am - 11:30 am*
12:30 pm - 1:30 pm	Lunch
1:30 pm - 2:30 pm	**Mentorship Component: Career Opportunities and Effective Networking** Discussion Leaders: **Huiming Guo** (University of California, Irvine , United States) and **Diletta Giuntini** (Eindhoven University of Technology, The Netherlands)
1:30 pm - 2:30 pm	**Panel Discussion** *Career Opportunities and Effective Networking* • **Colin Ophus** (Lawrence Berkeley National Laboratory, United States) • **John Blendell** (Purdue University, United States) • **Carol Handwerker** (Purdue University, United States)
2:30 pm - 3:00 pm	**Evaluation Period** *Complete the GRS Evaluation Forms; Election of Future Chair(s)*
3:00 pm	Seminar Concludes

Contributors

Support for this event was provided, in part, by National Institute of Standards and Technology financial assistance award 60NANB20D010.

This material is based upon work supported by the Air Force Office of Scientific Research under award number FA9550-20-1-0022. Any opinions, finding, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the United States Air Force.

GRC Attendee List

The list of attendees appears below, sorted by the role recorded in their registration record.

Name	Affiliation	Participation	Gender
Reimanis, Ivar E	Colorado School of Mines	Chair	Male
Garcia, Edwin	Purdue University	Vice Chair	Male
Kaplan, Wayne D	Technion - Israel Institute of Technology	Vice Chair	Male
Akono, Ange-Therese	Northwestern University	Speaker	Female
Bowman, William J	University of California, Irvine	Speaker	Male
Cahen, David	Weizmann Inst. of Science & Bar-Ilan Univ.	Speaker	Male
Castro, Ricardo HR	University of California at Davis	Speaker	Male
Conry, Bryan	University of Florida	Speaker	Male
Dickey, Elizabeth C	Carnegie Mellon University	Speaker	Female
Frolov, Timofey	LLNL	Speaker	Male
Gallivan, Rebecca	California Institute of Technology	Speaker	Female
Greer, Julia R	California Institute of Technology	Speaker	Female
Hemker, Kevin	Johns Hopkins University	Speaker	Male
Ikuhara, Yuichi	University of Tokyo	Speaker	Male
Kisailus, David J.	University of California, Irvine	Speaker	Male
Krause, Amanda	University of Florida	Speaker	Female
Leite, Edson Roberto R	Centro Nacional de Pesquisa em Energia e Materiais (CNPEM)	Speaker	Male
Luo, Jian	University of California, San Diego	Speaker	Male
Misture, Scott	Alfred University	Speaker	Male
Navrotsky, Alexandra	Arizona State University	Speaker	Female
O'Masta, Mark R	HRL Laboratories, LLC	Speaker	Male
Perry, Nicola Helen	University of Illinois Urbana-Champaign	Speaker	Female
Poerschke, David	University of Minnesota	Speaker	Male
Porz, Lukas	Technical University of Darmstadt	Speaker	Male
Qiu, Diana	Yale University	Speaker	Female
Rheinheimer, Wolfgang	Forschungszentrum Jülich	Speaker	Male
van Benthem, Klaus	University of California, Davis	Speaker	Male
Zok, Frank	University of California, Santa Barbara	Speaker	Male
Abdeljawad, Fadi	Clemson University	Discussion Leader	Male
Alem, Nasim	Penn State University	Discussion Leader	Female
Cox, Brian	Gentleman Scientist	Discussion Leader	Male
Fahrenholtz, William	Missouri University of Science and Technology	Discussion Leader	Male
Graeve, Olivia A	University of California, San Diego	Discussion Leader	Female
Haile, Sossina M	Northwestern University	Discussion Leader	Female
Hatzell, Kelsey B	Princeton University	Discussion Leader	Female
Huey, Bryan	University of Connecticut	Discussion Leader	Male
Rueschhoff, Lisa	AFRL	Discussion Leader	Female
Abdelsamie, Maged	Lawrence Berkeley National Laboratory	Poster Presenter	Male

Name	Affiliation	Participation	Gender
Acord, Katherine A	Air Force Research Laboratory	Poster Presenter	Female
Afful, Henry Q	Colorado School of Mines	Poster Presenter	Male
Bellafatto, Amanda J	Colorado School of Mines	Poster Presenter	Female
Berens, Scott W	University of California-Santa Barbara	Poster Presenter	Male
Brennecka, Geoff	Colorado School of Mines	Poster Presenter	Male
Carr, Connor	Northwestern University	Poster Presenter	Male
Champagne, Victor	Harvard University	Poster Presenter	Male
Christensen, Victoria	UC Santa Barbara Materials Department	Poster Presenter	Female
Cox, Dalton M	Northwestern University	Poster Presenter	Male
Del Cid-Ledezma, Karla M	University of Connecticut	Poster Presenter	Female
Donahue, Patrick M	Northwestern University	Poster Presenter	Male
Dyer, Isaac	Northwestern University	Poster Presenter	Male
Ebert, Julian Norbert	Forschungszentrum Jülich	Poster Presenter	Male
Ericks, Andrew R	University of California, Santa Barbara	Poster Presenter	Male
Fowler, Hannah	Purdue University	Poster Presenter	Female
Froemling, Till	Technical University of Darmstadt	Poster Presenter	Male
Furlan, Kaline P	Hamburg University of Technology - TUHH	Poster Presenter	Female
Futazuka, Toshihiro	The University of Tokyo	Poster Presenter	Male
Guo, Huiming	University of California, Irvine	Poster Presenter	Female
HADAGALLI, KOMALAKRUSHNA	Clemson University	Poster Presenter	Male
Hao, Taige	Univerity of California, Irvine	Poster Presenter	Male
Hermawan, Danny	Purdue University	Poster Presenter	Male
Hinricher, Jesse	Massachusetts Institute of Technology	Poster Presenter	Male
Jennings, Dylan	Forschungszentrum Jülich	Poster Presenter	Male
Kindelmann, Moritz	Forschungszentrum Jülich	Poster Presenter	Male
Ko, Shu-Ting	University of California, San Diego	Poster Presenter	Female
Koldehoff, Jasmin	Hamburg University of Technology	Poster Presenter	Female
Krogstad, Jessica A	University of Illinois at Urbana-Champaign	Poster Presenter	Female
Lee, Jong-Sook	Chonnam National University	Poster Presenter	Female
Lee, Jung-Eun	University of California, Irvine	Poster Presenter	Female
Lee, Seok-Woo	University of Connecticut	Poster Presenter	Male
Li, Zhongyuan	University of Connecticut	Poster Presenter	Male
Li, Jiao	Alfred University	Poster Presenter	Female
Lin, YuYing (Steven)	University of Illinois at Urbana-Champaign	Poster Presenter	Male
Louzon, Christopher J	Brown University	Poster Presenter	Male
McAllister, Maddie	University of California Santa Barbara	Poster Presenter	Female
McCormack, Scott J	University of California, Davis	Poster Presenter	Male
Mecholsky, John J	University of Florida	Poster Presenter	Male
Miao, Leixin	The Pennsylvania State University	Poster Presenter	Male
Milisavljevic, Iva	Alfred University	Poster Presenter	Female

Name	Affiliation	Participation	Gender
Ortiz, Luis	University of Connecticut	Poster Presenter	Male
Panda, Dillip K	Clemson University	Poster Presenter	Male
Plunkett, Alexander	Hamburg University of Technology	Poster Presenter	Male
qiu, zanlin	The Ohio State University	Poster Presenter	Male
Ribeiro, Caue	Brazilian Agriculture Research Corporation - Embrapa	Poster Presenter	Male
Sanchez, Maritza	University of California, San Diego	Poster Presenter	Female
Sanjuan, Alfredo	Purdue University	Poster Presenter	Male
Scherer, Michael	Technische Universität Darmstadt	Poster Presenter	Male
Sharma, Jai	Colorado School of Mines	Poster Presenter	Male
Sharma, Rituraj	Weizmann Institute of Science, Israel	Poster Presenter	Male
Song, Xuan	University of Iowa	Poster Presenter	Male
Srivastava, Shivani	University of California Berkeley	Poster Presenter	Female
Stern, Christian	Forschungszentrum Jülich	Poster Presenter	Male
Sternlicht, Hadas	National Center for Electron Microscopy, Lawrence Berkeley National Laboratory	Poster Presenter	Female
Velazquez Plaza, Amanda M	University of Florida	Poster Presenter	Female
Wang, Jiayue	Massachusetts Institute of Technology	Poster Presenter	Male
Yang, Bo	Purdue University	Poster Presenter	Male
Yu, Yueh-Cheng	University of Minnesota	Poster Presenter	Male
Zahler, Marc Pascal	Forschungszentrum Jülich (FZJ)	Poster Presenter	Male
Blendell, John E	Purdue University	Attendee	Male
Coffman, D. Keith	University of Illinois Urbana-Champaign	Attendee	Male
de Souza, Flavio Leandro	Brazilian Nanotechnology National Laboratory	Attendee	Male
Giuntini, Diletta	Eindhoven University of Technology	Attendee	Female
Handwerker, Carol A	Purdue University	Attendee	Female
Hay, Randall S	Air Force Research Laboratory	Attendee	Male
Martin, Andrew	Lawrence Berkeley National Laboratory	Attendee	Male
Packard, Corinne E	Colorado School of Mines	Attendee	Female
Price, Patrick	Sandia National Laboratories	Attendee	Male
Qian, Xin	Saint-Gobain Corporation	Attendee	Male
Rohrer, Gregory S	Carnegie Mellon University	Attendee	Male
Shifler, David A	Program Officer	Attendee	Male
Stonkevitch, Katya	HRL Laboratories, LLC.	Attendee	Female
Tobin, Zachary	Free Form Fibers	Attendee	Male
Turcer, Laura	Saint-Gobain	Attendee	Female
Walker, Luke S	Heraeus	Attendee	Male
Wu, Yiquan	Alfred University	Attendee	Male
Zhang, Nan	Saint Gobain	Attendee	Female
Zhao, Ji-Cheng (JC)	University of Maryland	Attendee	Male

GRS Attendee List

The list of attendees appears below, sorted by the role recorded in their registration record.

Note: Only one primary role is recorded for each registration record, even if the attendee served in multiple roles at the meeting. The recorded role is based on the order of precedence listed below.

Name	Affiliation	Participation	Gender
Koldehoff, Jasmin	Hamburg University of Technology	Chair	Female
Sternlicht, Hadas	National Center for Electron Microscopy, Lawrence Berkeley National Laboratory	Chair	Female
Abdelsamie, Maged	Lawrence Berkeley National Laboratory	Speaker	Male
Blendell, John E	Purdue University	Speaker	Male
Ericks, Andrew R	University of California, Santa Barbara	Speaker	Male
Froemling, Till	Technical University of Darmstadt	Speaker	Male
Funni, Stephen	Carnegie Mellon University	Speaker	Male
Handwerker, Carol A	Purdue University	Speaker	Female
Jennings, Dylan	Forschungszentrum Jülich	Speaker	Male
Kindelmann, Moritz	Forschungszentrum Jülich	Speaker	Male
Martin, Andrew	Lawrence Berkeley National Laboratory	Speaker	Male
Milisavljevic, Iva	Alfred University	Speaker	Female
Ophus, Colin	Lawrence Berkeley National Laboratory	Speaker	Male
Plunkett, Alexander	Hamburg University of Technology	Speaker	Male
Porz, Lukas	Technical University of Darmstadt	Speaker	Male
Srivastava, Shivani	University of California Berkeley	Speaker	Female
Wang, Jiayue	Massachusetts Institute of Technology	Speaker	Male
Bowman, William J	University of California, Irvine	Discussion Leader	Male
Conry, Bryan	University of Florida	Discussion Leader	Male
Cox, Dalton M	Northwestern University	Discussion Leader	Male
Giuntini, Diletta	Eindhoven University of Technology	Discussion Leader	Female
Guo, Huiming	University of California, Irvine	Discussion Leader	Female
Rizzie, Steven G	University of California, Santa Barbara	Discussion Leader	Male
Acord, Katherine A	Air Force Research Laboratory	Poster Presenter	Female
Afful, Henry Q	Colorado School of Mines	Poster Presenter	Male
Atkinson, Cassidy	University of Connecticut	Poster Presenter	Female
Aumen, Andrew	Carnegie Mellon University	Poster Presenter	Male
Bellafatto, Amanda J	Colorado School of Mines	Poster Presenter	Female
Berens, Scott W	University of California-Santa Barbara	Poster Presenter	Male
Del Cid-Ledezma, Karla M	University of Connecticut	Poster Presenter	Female
Donahue, Patrick M	Northwestern University	Poster Presenter	Male
Dyer, Isaac	Northwestern University	Poster Presenter	Male
Ebert, Julian Norbert	Forschungszentrum Jülich	Poster Presenter	Male
Evans, Charles	Carnegie Mellon University	Poster Presenter	Male
Fowler, Hannah	Purdue University	Poster Presenter	Female
Gallivan, Rebecca	California Institute of Technology	Poster Presenter	Female

Name	Affiliation	Participation	Gender
HADAGALLI, KOMALAKRUSHNA	Clemson University	Poster Presenter	Male
Hermawan, Danny	Purdue University	Poster Presenter	Male
Hinricher, Jesse	Massachusetts Institute of Technology	Poster Presenter	Male
Ko, Shu-Ting	University of California, San Diego	Poster Presenter	Female
Li, Jiao	Alfred University	Poster Presenter	Female
Louzon, Christopher J	Brown University	Poster Presenter	Male
Ortiz, Luis	University of Connecticut	Poster Presenter	Male
Panda, Dillip K	Clemson University	Poster Presenter	Male
Reimanis, Ivar E	Colorado School of Mines	Poster Presenter	Male
Sanchez, Maritza	University of California, San Diego	Poster Presenter	Female
Sanjuan, Alfredo	Purdue University	Poster Presenter	Male
Scherer, Michael	Technische Universität Darmstadt	Poster Presenter	Male
Sharma, Jai	Colorado School of Mines	Poster Presenter	Male
Stern, Christian	Forschungszentrum Jülich	Poster Presenter	Male
Stonkevitch, Katya	HRL Laboratories, LLC.	Poster Presenter	Female
Velazquez Plaza, Amanda M	University of Florida	Poster Presenter	Female
Xu, Yunzhi	Northwestern University	Poster Presenter	Female
Yu, Yueh-Cheng	University of Minnesota	Poster Presenter	Male
Zahler, Marc Pascal	Forschungszentrum Jülich (FZJ)	Poster Presenter	Male