

# 2017 NSF Career Development Workshop in Ceramics

*May 20 & 21, 2017*

*Waikoloa, Hawaii, United States*

*Hilton Waikoloa Village*

*Kona 4 Room*



DMR1734055

## Welcome to the Workshop

The primary goal of the 2017 NSF Professional Development Workshop in Ceramics is to enhance the career development of the next generation of leaders in ceramic materials research and education. This two-day workshop brings together recent CAREER awardees with a group of US-based and international experts in their respective research areas in a forum that promotes technical and non-technical discussions. The workshop provides a platform for the CAREER awardees to hone their research ideas, address potential challenges that might be encountered in their research plans, and build a strong professional network with an international component. In addition to the panel discussions for each of the CAREER awardees, the workshop includes presentations and facilitated panel discussions on topics such as mentoring success stories, managing graduate students and collaborators, navigating the tenure track, and an open discussion of the future of ceramics research and education. The workshop is open to not only recent NSF Ceramics CAREER awardees and their mentors, but also other interested members of the ceramics community, especially junior faculty, post-doctoral researchers, and senior graduate students.

The organizers sincerely hope you will build a strong professional network and foster new collaborative opportunities through the Workshop.

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*Hui (Claire) Xiong, Boise State University, [clairexiong@boisestate.edu](mailto:clairexiong@boisestate.edu)*

*Liping Huang, Rensselaer Polytechnic Institute, [huangL5@rpi.edu](mailto:huangL5@rpi.edu)*

## About the NSF CAREER Award Program

The workshop targets early-career faculty who have recently been awarded NSF CAREER grants from the DMR Ceramics Program. The NSF Faculty Early Career Development Program (program solicitation NSF 17-537), better known as the CAREER program, is the agency's most prestigious award for early-career faculty. The program is designated for untenured assistant professors who are beginning their independent research careers. Proposals for the CAREER program are expected to contain sections devoted to research, teaching, and the integration of research into education. Applicants are encouraged to have assessment plans for both the research and education efforts to determine if the goals described in the proposal are met. Finally, CAREER proposals may also include an international component, if the activities and benefits of the international interaction are clearly defined.

If you would like to learn more about the progress of faculty that have received NSF CAREER Awards on Ceramics you can read NSF DMR Ceramics program Manager, Dr. Lynnette Madsen's articles in the American Ceramic Society Bulletin. In the January-February 2017 issue, you will find the article "5 new National Science Foundation CAREER Ceramic awardees: Class of 2016", which showcased the research and engagement activities of five junior faculty as recipients of the CAREER awards in 2016.

## Recent Ceramics CAREER Awardees and Speakers



**Dr. Geoff Brenneka** is an Assistant Professor in the George S. Ansell Department of Metallurgical and Materials Engineering at the Colorado School of Mines. Geoff received BS and MS degrees in Ceramic Engineering at the University of Missouri-Rolla (now Missouri S&T) in 2001 and 2002, respectively, and a PhD in Materials Science and Engineering from the University of Illinois at Urbana-Champaign in 2006. After a year as a post-doctoral researcher in the Electronic, Optical, and Nanostructured Materials Department at Sandia National Laboratories in Albuquerque, NM, Geoff was hired on as a technical staff member in the same group. He moved to academia in 2014 and was awarded an NSF CAREER grant in 2016 which will, in part, quantify the effects of various defects and interfaces on the dynamic response(s) of ferroelectric domain walls under high power drive conditions.



**Dr. Candace K. Chan** is an Assistant Professor of Materials Science and Engineering at Arizona State University (ASU) and is also a member of the graduate faculty in the Department of Chemistry. Prior to joining ASU, Candace was a Miller Postdoctoral Fellow at UC Berkeley in the Department of Chemistry and received her PhD in Chemistry from Stanford in 2009. Her research group designs and studies the unique properties of nanostructured materials for electrochemical energy storage, photocatalysis, and water treatment. Her NSF CAREER project seeks to use nanowires to understand  $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$  phase stability, crystallization, and sintering processes. Core-shell nanowire structures are used to investigate interfacial properties and transport in composites, as well as to understand how to maximize highly conducting pathways for lithium ions and uniformly modify grain boundaries. *In situ* and aberration-corrected transmission electron microscopy characterization is being correlated with ionic conductivity and electrochemical cycling tests; these can ultimately lead to higher ionic conductivity ceramic electrolytes.



**Dr. William Chueh** is an assistant professor in the Department of Materials Science and Engineering at Stanford University and a Center Fellow at the Precourt Institute for Energy. Will received a BS in Applied Physics in 2005 and a PhD in Materials Science and Engineering in 2010, both from Caltech. His research explores efficient electrochemical routes for converting solar energy to chemical fuels and subsequently to electricity in addition to developing next-generation electrochemical energy storage materials. Using powerful electron, X-ray and optical microscopy and spectroscopy techniques, Will and his group visualize electrochemical reactions as they take place on length scales ranging from tens of microns to sub-nm. These fundamental observations, combined with atomistic- and continuum-level models, lead to new insights into the design of functional materials with novel compositions and structures.



**Dr. Wei Lai** is an Associate Professor in the department of Chemical Engineering and Materials Science at Michigan State University (MSU). He received his BS and MS in Materials Science at the University of Science and Technology of China in 1998 and 2001. He obtained his PhD in Materials Science at the California Institute of Technology in 2007. Before joining MSU, he was a postdoctoral associate in the Department of Materials Science and Engineering at the Massachusetts Institute of Technology. His research interests are focused on materials for energy storage and conversion through integrated experimental and computational methods, and his CAREER award focuses on structure-

property relationships in bifunctional battery materials such as the family of sodium nickel titanates that show promise as potentially being able to function as either anode or cathode in sodium-ion batteries.



**Dr. Hui (Claire) Xiong** is an Assistant Professor in the Micron School of Materials Science and Engineering at Boise State University. Claire received a BS in Applied Chemistry, MS in Inorganic Chemistry from East China University of Science and Technology, and a PhD in Analytical Chemistry from the University of Pittsburgh. Between 2008 - 2012, she conducted postdoc work at Harvard University and Argonne National Laboratory where her research involved electrochemical characterization of micro-fabricated cathode materials for micro-solid oxide fuel cells and the development of novel nanostructured electrode materials for rechargeable batteries. Xiong received the NSF CAREER Award in 2015. Her current research is focused on design and

development of nanoarchitected and defect-driven electrode materials, electrolyte stability, and ion-irradiated electrode materials for rechargeable batteries including Li-ion and Na-ion batteries.



**Dr. Claire White** is an Assistant Professor in the Department of Civil & Environmental Engineering and the Andlinger Center for Energy and the Environment at Princeton University. Dr. White received a BEng in Civil Engineering and a BS in Physics from the University of Melbourne, Australia, in 2006 and completed her graduate studies in 2010 at the University of Melbourne supported by an Australian Postgraduate Award. After receiving her PhD, she worked as a postdoc at Los Alamos National Laboratory and was awarded a Director's Postdoctoral Fellowship. Her research group focuses on understanding and optimizing engineering materials, including low-CO<sub>2</sub> cements and CO<sub>2</sub> storage. This research spans multiple length and time scales,

utilizing advanced synchrotron and neutron-based experimental techniques, and simulation methodologies.



**Dr. Yiquan Wu** is an Associate Professor of Ceramics and Materials Science at the New York State College of Ceramics at Alfred University. He received his PhD from Imperial College London, England. His current research focuses on transparent materials for optical and photonic applications, as well as the synthesis and characterization of nanostructured materials for energy and biomedical applications. His CAREER project is investigating off-valence substitution for valence control of dopant ions in laser ceramics. His research work has been funded by the NSF, ONR, AFOSR, DTRA, national laboratories, and industry. Dr. Wu has published over 87 peer-reviewed articles and delivered 45 invited talks on optical materials, thin

films, laser sintering, biomaterials, nanostructured materials, and advanced ceramics. He has also served as a co-organizer for numerous national and international professional conferences.

## Workshop Panelists

Jenny Andrew, University of Florida  
Scott Barnett, Northwestern University  
Guozhong Cao, University of Washington  
Shen Dillon, University of Illinois at Urbana–Champaign  
Marca Doeff, Lawrence Berkeley National Laboratory  
Bruce Dunn, University of California, Los Angeles  
Kathy Faber, California Institute of Technology  
Bill Fahrenholtz, Missouri University of Science and Technology  
Hiroschi Funakubo, Tokyo Institute of Technology  
Liping Huang, Rensselaer Polytechnic Institute  
Akio Ikesue, World Lab Company  
Trudy Kriven, University of Illinois at Urbana–Champaign  
Meilin Liu, Georgia Institute of Technology  
Lynnette Madsen, NSF  
Jon-Paul Maria, North Carolina State University  
Steve Martin, Iowa State University  
Martha Mecartney, University of California, Irvine  
Shirley Meng, University of California, San Diego  
Alex Navrotsky, University of California, Davis  
John Provis, University of Sheffield  
Greg Rohrer, Carnegie Mellon University  
Debra Rolison, Naval Research Laboratory  
Susan Trolier-McKinstry, The Pennsylvania State University  
Di Zhang, Shanghai Jiaotong University

## Workshop Schedule May 20, 2017

<b>Time</b>	<b>Activity</b>	<b>Description</b>
8:30 am	Continental Breakfast	Informal discussions and networking
9:00 am	Welcome and Overview	Organizers
9:15 am	Participant Introductions	Self-introductions to promote networking throughout workshop
9:45 am	Mentoring success stories <i>Moderator: Bruce Dunn</i>	Jenny Andrew, University of Florida Liping Huang, Rensselaer Polytechnic Institute Susan Trolier-McKinstry, Penn State University Alex Navrotsky University of California, Davis
10:30 am	Break	coffee
11:00 am	Awardee Session I <i>Moderator: Liping Huang</i>	Will Chueh, Stanford University
11:30 am	Awardee I Panel, Q&A <i>Moderator: Liping Huang</i>	Shirley Meng, University of California, San Diego Scott Barnett, Northwestern University Meilin Liu, Georgia Institute of Technology
12:00 pm	Lunch	On site lunch for discussions and networking
1:00 pm	Awardee Session II <i>Moderator: Geoff Brennecka</i>	Hui (Claire) Xiong, Boise State University
1:30 pm	Awardee II Panel, Q&A <i>Moderator: Geoff Brennecka</i>	Bruce Dunn, University of California, Los Angeles Guozhong Cao, University of Washington Debra Rolison, Naval Research Laboratory
2:00 pm	Awardee Session III <i>Moderator: Liping Huang</i>	Geoff Brennecka, Colorado School of Mines
2:30pm	Awardee III Panel, Q&A <i>Moderator: Liping Huang</i>	Susan Trolier-McKinstry, Penn State University Jon-Paul Maria, NC State University Hiroshi Funakubo, Tokyo Institute of Technology
3:00 pm	Break	coffee
3:30 pm	Managing grad students and collaborators <i>Moderator: Alex Navrotsky</i>	Steve Martin, Iowa State University Bill Fahrenholtz, Missouri University of Science and Technology Bruce Dunn, University of California, Los Angeles Debra Rolison, Naval Research Laboratory
4:15 pm	Awardee Session IV <i>Moderator: Claire Xiong</i>	Candace Chan, Arizona State University
4:45 pm	Awardee IV Panel, Q&A <i>Moderator: Claire Xiong</i>	Marca Doeff, Lawrence Berkeley National Laboratory Shirley Meng, University of California, San Diego Shen Dillon, University of Illinois at Urbana-Champaign
5:15 pm	End of formal programming	
6:00 pm	Dinner	Onsite dinner for informal discussions and networking

## Workshop Schedule May 21, 2017

<b>Time</b>	<b>Activity</b>	<b>Description</b>
8:30 am	Continental Breakfast	Informal discussions and networking
9:00 am	(Avoiding) Common Pitfalls of Junior Faculty; Navigating the Tenure Track <i>Moderator: Martha Mecartney</i>	Shen Dillon, University of Illinois at Urbana–Champaign John Provis, University of Sheffield Jon-Paul Maria, NC State University Liping Huang, Rensselaer Polytechnic Institute
9:45 am	Awardee Session V <i>Moderator: Liping Huang</i>	Wei Lai, Michigan State University
10:15 pm	Awardee IV Panel, Q&A <i>Moderator: Liping Huang</i>	Scott Barnett, Northwestern University Steve Martin, Iowa State University Meilin Liu, Georgia Institute of Technology
10:45 am	Break	coffee
11:15 am	Work-Life Balance <i>Moderator: Will Chueh</i>	Jenny Andrew, University of Florida Martha Mecartney, University of California, Irvine Marca Doeff, Lawrence Berkeley National Laboratory Guozhong Cao, University of Washington
12:00 pm	Lunch	With the ACerS Board of Directors
1:00 pm	Awardee Session VI <i>Moderator: Claire Xiong</i>	Claire White, Princeton University
1:30 pm	Awardee VI Panel, Q&A <i>Moderator: Claire Xiong</i>	John Provis, University of Sheffield Alex Navrotsky, University of California, Davis Trudy Kriven, University of Illinois at Urbana–Champaign
2:00 pm	Break	
2:30 pm	Awardee Session VII <i>Moderator: Claire Xiong</i>	Yiquan Wu, Alfred University
3:00 pm	Awardee VI Panel, Q&A <i>Moderator: Claire Xiong</i>	Akio Ikesue, World Lab Company Martha Mecartney, University of California, Irvine Di Zhang, Shanghai Jiaotong University
3:30 pm	Future of Ceramics Research and Education <i>Moderator: JP Maria</i>	Summary of recent NSF workshop followed by broader discussion Lynnette Madsen, NSF Kathy Faber, California Institute of Technology Bill Fahrenholtz, Missouri University of Science and Technology Greg Rohrer, Carnegie Mellon University
5:00 pm	Wrap up and feedback	Organizers
5:15 pm	Adjourn	