U.S. DEPARTMENT OF ENERGY | Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

SOLAR ENERGY TECHNOLOGIES OFFICE

SOLAR ENERGY TECHNOLOGIES OFFICE CSP PROGRAM SUMMIT 2019

EVENT PROGRAM

MARCH 18–19
2019

OAKLAND, CA
Marriott City Center

MONDAY, MARCH 18, 2019

8:00AM–8:30AM	**REGISTRATION**	
8:30AM–8:45AM	**INTRODUCTION** *Charlie Gay, Director, Solar Energy Technologies Office, U.S. Department of Energy (DOE)*	Junior Ballroom
8:45AM–9:00AM	**Concentrating Solar-Thermal Power (CSP) Overview** *Avi Shultz, CSP Program Manager, Solar Energy Technologies Office*	Junior Ballroom
9:00AM-10:30AM	**Panel – CSP in the Evolving Grid and Energy Market** *Cara Libby, Electric Power Research Institute (Moderator)* *Paul Denholm, National Renewable Energy Laboratory* *Caitlin Murphy, National Renewable Energy Laboratory* *Jimmy Nelson, E3* *Logan Goldie-Scot, Bloomberg NEF*	Junior Ballroom
10:30AM–11:00AM	**BREAK**	
11:00AM–12:30PM	**Panel – The Potential U.S. Market for CSP** *Heather Curlee, Wilson Sonsini (Moderator)* *Ric O'Connell, Gridlab* *Jenifer Hedrick, Southern California Edison* *Clyde Loutan, California Independent System Operator* *Byron Woertz, Western Electricity Coordinating Council*	Junior Ballroom
12:30PM–1:30PM	**LUNCH**	
1:30PM–3:00PM	**Panel – CSP Development Around the World** *David Kearney, K&A (Moderator)* *Hicham Bouzekri, Moroccan Agency for Sustainable Energy (MASEN)* *Zhifeng Wang, Chinese Academy of Sciences* *Wes Stein, Commonwealth Scientific Industrial Research Organization (CSIRO)* *Ana María Ruz, Corporación de Fomento de la Producción de Chile (CORFO)* *Mercedes Sierra, SENER Engineering and Systems, Inc.*	Junior Ballroom
3:00PM-3:15PM	**Overview of the DOE CSP Program** *Avi Shultz, Solar Energy Technologies Office*	Junior Ballroom
3:15PM–3:45PM	**BREAK**	
3:45PM–6:00PM	**POSTER SESSION AND NETWORKING**	OCC 208/210/211

TUESDAY, MARCH 19, 2019

TECHNICAL PLENARY—GEN3 CSP FULLY INTEGRATED PROJECTS		
8:30AM–10:00AM	**Awardee Presentations, Panel, and Q&A Discussion** **Liquid-Phase Pathway to Sunshot** *Craig Turchi, National Renewable Energy Laboratory* **Particle Pilot Plant (G3P3): Integrated High-Temperature Particle System for CSP** *Cliff Ho, Sandia National Laboratories* **Gen3 Gas-Phase System Development and Demonstration** *Shaun Sullivan, Brayton Energy*	Junior Ballroom
10:00AM–10:30AM	**BREAK**	
PARALLEL TECHNICAL SESSIONS		
10:30AM–12:00PM	**MOLTEN SALTS** **Technical Plenary Presentation** **Enabling High-Temperature Molten Salt CSP through the Facility to Alleviate Salt Technology Risks (FASTR)** *Kevin Robb, Oak Ridge National Laboratory* **Awardee Presentations** **Comparison of Protecting Layer Performance for Corrosion Inhibition in Molten Chloride Salts through Interfacial Studies at the Molecular Scale** *Sheng Dai, Oak Ridge National Laboratory* **Full Loop Thermodynamic Corrosion Inhibition and Sensing in Molten Chloride Systems** *Brenda Garcia-Diaz, Savannah River National Laboratory* **Molten Chloride Thermophysical Properties, Chemical Optimization, and Purification** *Judith Vidal, National Renewable Energy Laboratory* **Progression to Compatibility Evaluations in Flowing Molten Salts** *Bruce Pint, Oak Ridge National Laboratory* **Development of In-Situ Corrosion Kinetics and Salt Property Measurements** *Li Liu, Rensselaer Polytechnic* **High Temperature, Raman Spectroscopy Based, Inline, Molten Salt Composition Monitoring System for Concentrating Solar Power Systems** *Kevin Harsh, Sporian Microsystems*	Oakland

TUESDAY, MARCH 19, 2019

10:30AM–12:00PM	**PARTICLE TECHNOLOGIES** **Technical Plenary Presentation** **Advanced Characterization of Particulate Flows for Concentrating Solar Power Applications** *Peter Loutzenhiser, Georgia Tech* **Awardee Presentations** **Characterization and Mitigation of Radiative, Convective, and Particle Losses in High-Temperature Particle Receivers** *Cliff Ho, Sandia National Laboratories* **High-Temperature Particle Heat Exchanger for sCO_2 Power Cycles** *Cliff Ho, Sandia National Laboratories* **Quantifying Thermophysical Properties and Durability of Particles and Materials for Direct and Indirect Heat Transfer Mechanisms** *Kevin Albrecht, Sandia National Laboratories* **GEN3D Experimental and Numerical Development of Gen3 Durability Life Models** *Todd Otanicar, University of Tulsa* **Thermophysical Property Measurements of Heat Transfer Media and Containment Materials** *Shannon Yee, Georgia Tech* **Non-Contact Thermophysical Characterization of Solids and Fluids for Concentrating Solar Power** *Renkun Chen, University of California, San Diego*	California

TUESDAY, MARCH 19, 2019

10:30AM–12:00PM	**DESALINATION COLLECTORS AND SYSTEMS** **Technical Plenary Presentation** **Solar for Industrial Process Heat** *Robert Margolis, National Renewable Energy Laboratory* **Awardee Presentations** **Direct Solar Thermal Forward Osmosis Desalination Of Produced Waters** *Robert Kostecki, Lawrence Berkeley National Laboratory* **Energy Where it Matters: Delivering Heat to the Membrane/Water Interface for Enhanced Thermal Desalination** *David Jassby, University of California, Los Angeles* **Low-Cost Desalination Using Nanophotonics Enhanced Direct Solar Membrane Distillation** *Qilin Li, Rice University* **Solar-Driven Desalination by Membrane Distillation using Ceramic Membranes** *Jeffery McCutcheon, Fraunhofer Center for Energy Innovation* **Zero Liquid Discharge Water Desalination Process using Humidification-Dehumidification in a Thermally-Actuated Transport Reactor** *Bahman Abbasi, Oregon State University* **High-Efficiency, Zero Liquid Discharge, Multiple Effect Adsorption Distillation** *Howard Yuh, GreenBlu* **Supercritical Treatment Technology for Water Purification** *Michael Mann, University of North Dakota*	Junior Ballroom
12:00PM–2:00PM	**LUNCH AND POSTER SESSION**	OCC 208/210/211
	PARALLEL BREAKOUT SESSIONS	

TUESDAY, MARCH 19, 2019

2:00PM–3:30PM	**COMPONENTS FOR GEN3 CSP** **Awardee Presentations** **Robust High-Temperature Heat Exchangers** *Kenneth Sandhage, Purdue University* **High-Temperature Pumps and Valves for Molten Salt** *Asegun Henry, Massachusetts Institute of Technology* **Integrated Thermal Energy Storage Heat Exchanger for Concentrating Solar Power Applications** *Jim Nash, Brayton Energy* **Development of High-Temperature Molten Salt Pump Technology for Gen3 Solar Power Tower Systems** *Keith Oldinski, Hayward Tyler* **Oil-Free, High-Temperature Heat Transfer Fluid Circulator** *Hooshang Heshmat, Mohawk Innovative Technology* **Low-Cost High Temperature Ceramic Heat Exchangers** *Dileep Singh, Argonne National Laboratory*	Oakland
2:00PM–3:30PM	**THERMAL ENERGY STORAGE** **Awardee Presentations** **Power Cycle with Integrated Thermochemical Energy Storage** *Timothy Held, Echogen Power Systems* **Integrated Solar Receiver with Thermal Storage for an sCO2 Power Cycle** *Shaun Sullivan, Brayton Energy* **Solar Thermal Energy Ammonia Production (STEAP)** *Andrea Ambrosini, Sandia National Laboratories* **Integrated Heat Pumps Thermal Storage and Power Cycle for CSP** *Joshua McTigue, National Renewable Energy Laboratory* **Real-Time Operations Optimization Software** *Michael Wagner, National Renewable Energy Laboratory*	California

TUESDAY, MARCH 19, 2019

2:00PM–3:30PM	**DESALINATION** **Awardee Presentations** **Ultra-Compact and Efficient Heat Exchanger for Solar Desalination with Unprecedented Scaling Resistance** *Anthony Jacobi, University of Illinois at Urbana-Champaign* **Hawaii Solar Desalination Project** *Gregory Barbour, Natural Energy Laboratory of Hawaii Authority* **SkyTrough Vacuum Membrane: An Extreme Low-Cost Solar-Thermal Collector for Desalination** *Nate Schuknecht, Skyfuel* **Solar Steam on Demand** *Philip Gleckman, Sunvapor* **Loop Thermosyphon Enhanced Solar Collector** *Fangyu Cao, Advanced Cooling Technology* **The Internal Compound Parabolic Concentrator (ICPC): A Novel Low Cost Solar-Thermal Collection System for Desalination Processes** *Roland Winston, University of California, Merced* **GIS-Based Graphical User Interface Tool for Analyzing Solar Thermal Desalination Systems and High-Potential Implementation Regions** *Vasilis Fthenakis, Columbia University*	Junior Ballroom
3:30PM–4:00PM	**BREAK**	
	PARALLEL BREAKOUT SESSIONS	

TUESDAY, MARCH 19, 2019

4:00PM–5:30PM	**METALS AND MATERIALS** **Technical Plenary Presentation** **Improving Economics of Gen3 CSP System Components through Fabrication and Application of High-Temperature Nickel-Based Alloys** *John Shingledecker, Electric Power Research Institute* **Awardee Presentations** **Creep-Fatigue Behavior and Damage Accumulation of a Candidate Structural Material for Concentrating Solar Power Solar-Thermal Receiver** *Michael Mcmurtrey, Idaho National Laboratory* **Ceramic Castable Cement Tanks and Piping for Molten Salt** *Asegun Henry, Massachusetts Institute of Technology* **Cast Components for High-Temperature CSP Thermal Systems** *Govindarajan Muralidharan, Oak Ridge National Laboratory* **Novel Corrosion and Erosion Protective Amorphous Alloys Coatings** *Evelina Vogli, LM Group Holdings* **High-Toughness Cermets for Molten Salt Pumps** *Joseph Hensel, Powdermet*	Oakland
4:00PM–5:30PM	**POWER CYCLES** **Technical Plenary Presentation** **Development of a High-Efficiency Hot Gas Turbo-Expander and Low-Cost Heat Exchangers for Concentrating Solar Power Applications** *Jeff Moore, Southwest Research Institute* **Awardee Presentations** **Compression System Design and Testing for sCO_2 CSP Operation** *Jason Mortzheim, General Electric* **Sodium Ion Expansion Engine Power Block for Distributed CSP** *Shannon Yee, Georgia Tech* **Development of an Integrally Geared Compressor-Expander for sCO_2 Brayton Cycle Power Generation Applications** *Jason Wilkes, Southwest Research Institute* **Advanced Supercritical Carbon Dioxide Cycles Regenerator** *Mark Anderson, University of Wisconsin* **High-Flux Microchannel Receiver Development** *Brian Fronk, Oregon State University* **Design and Implementation of a 1-3 MW_{th} sCO_2 Support Loop for Maturation of Molten Salt, Particulate, and Gas-Phase Thermal Storage Primary Heat Exchangers** *Matt Carlson, Sandia National Laboratories*	California

TUESDAY, MARCH 19, 2019

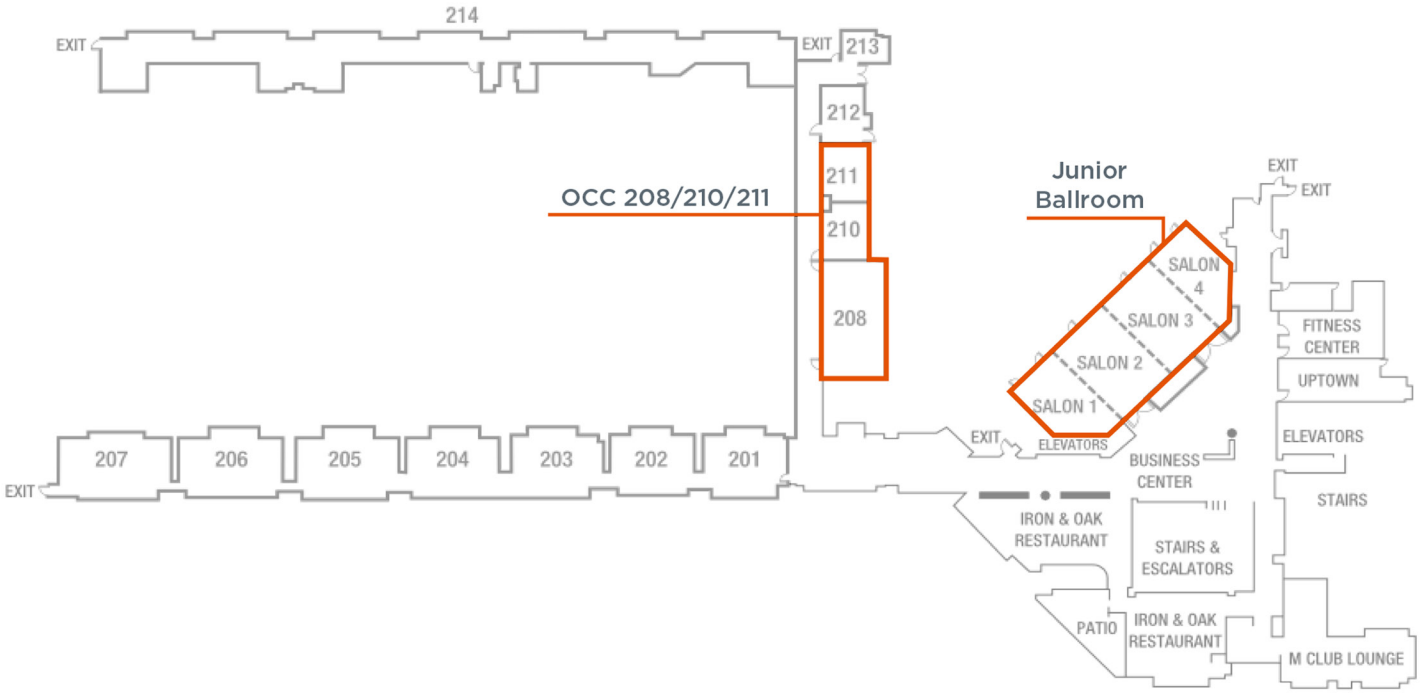
4:00PM–5:30PM	**COLLECTORS** **Awardee Presentations** **ATLAS: Advanced Trough with Lower-Cost System-Architecture** *Patrick Marcotte, Solar Dynamics* **DROP C: The Drop-in, Ring-of-Power Heliostat** *Kyle Kattke, Solar Dynamics* **Dielectric Metasurface Concentrators** *Boubacar Kante, University of California, San Diego* **Low-Cost Concentrated Solar Power Collector** *Greg Mungas, Hyperlight Energy* **Universal Field Assessment & Survey Tool** *Julius Yellowhair, Sandia National Laboratories* **Distant Observer Solar Field Aerial Collector Field Evaluation** *Guangdong Zhu, National Renewable Energy Laboratory* **Development and Validation of A Xenon Arc Lamp Accelerated Aging Method for CSP Solar Mirrors** *Robert Tirawat, National Renewable Energy Laboratory* **Full-Scale Hydrogen Mitigation Installation and Testing at Nevada Solar One** *Greg Glatzmaier, National Renewable Energy Laboratory*	Junior Ballroom
5:30PM–6:00PM	**CLOSING SESSION**	Junior Ballroom

Venue Information

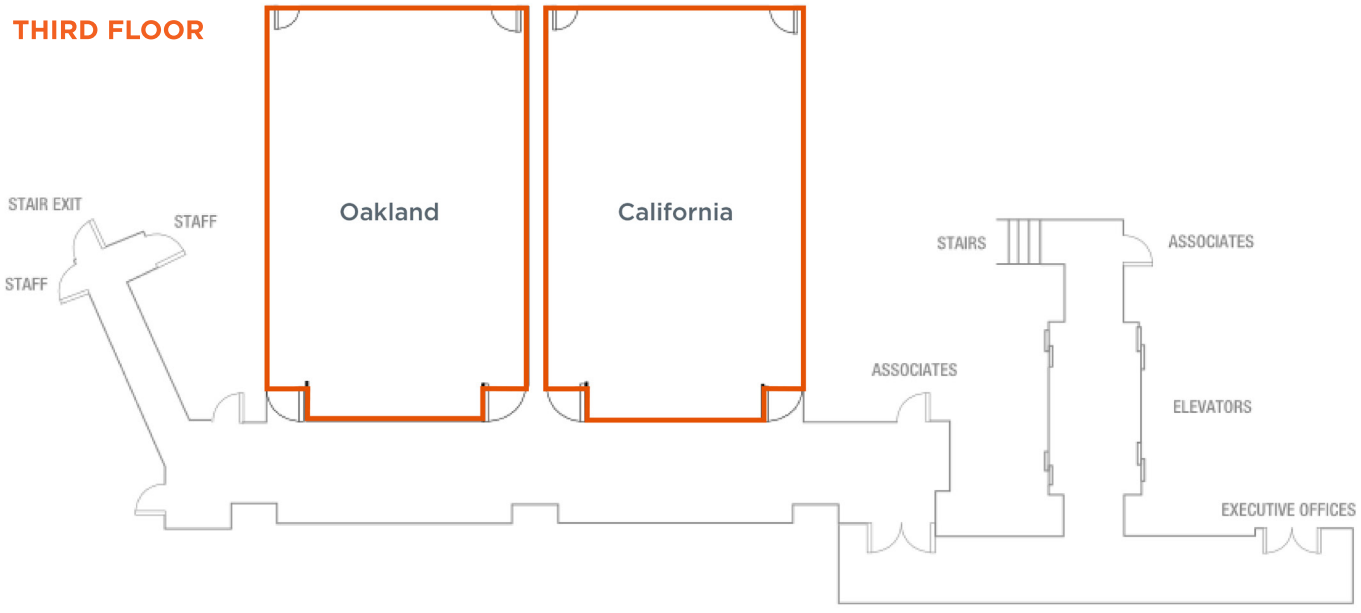
OAKLAND MARRIOTT CITY CENTER

1001 Broadway
Oakland, CA 94607
TEL: +1 510-451-4000

SECOND FLOOR



THIRD FLOOR



SETO CSP Poster Session

FUNDING PROGRAM COLOR KEY

- Solar Desalination
- CSP: APOLLO
- Other
- FY19-21 SETO Lab Call
- SETO FY18 Funding Program
- Gen3 CSP

SETO CSP AWARDEE POSTERS

Awardee	Poster #	Project Title	PI Name
Lawrence Berkeley National Laboratory	1	Direct Solar-Thermal Forward Osmosis Desalination of Produced Waters	Robert Kostecki
University of Illinois at Urbana-Champaign	2	Ultra-Compact and Efficient Heat Exchanger for Solar Desalination with Unprecedented Scaling Resistance	Anthony Jacobi
University of California, Merced	3	The Internal Compound Parabolic Concentrator (ICPC): A Novel Low-Cost Solar-Thermal Collection System for Desalination Processes	Roland Winston
Columbia University	4	GIS-Based Graphical User Interface Tool for Analyzing Solar-Thermal Desalination Systems and High-Potential Implementation Regions	Vasilis Fthenakis
Natural Energy Laboratory of Hawaii Authority	5	Hawaii Solar Desalination Project	Gregory Barbour
Greenblu	6	High-Efficiency, Zero Liquid Discharge, Multiple Effect Adsorption Distillation	Howard Yuh
Oregon State University	7	Zero Liquid Discharge Water Desalination Process Using Humidification-Dehumidification in a Thermally-Actuated Transport Reactor	Bahman Abbasi
Fraunhofer Center for Energy Innovation	8	Solar-Driven Desalination by Membrane Distillation Using Ceramic Membranes	Jeffery McCutcheon
University of North Dakota	9	Supercritical Treatment Technology for Water Purification	Michael Mann
University of California, Los Angeles	10	Energy Where it Matters: Delivering Heat to the Membrane/Water Interface for Enhanced Thermal Desalination	David Jassby
Rice University	11	Low-Cost Desalination Using Nanophotonics Enhanced Direct Solar Membrane Distilation	Qilin Li
Skyfuel	12	SkyTrough Vacuum Membrane: An Extreme Low-Cost Solar-Thermal Collector for Desalination	Nate Schuknecht
Sunvapor	13	Solar Steam on Demand	Philip Gleckman
Advanced Cooling Technology	14	Loop Thermosyphon Enhanced Solar Collector	Fangyu Cao
Boston University	15	Enhancement of Optical Efficiency of CSP Mirrors and Receivers with Reduced O&M Cost via Near-Continuous Operation of Self-Cleaning Electrodynamic Screens	Malay Mazumder
Solar Dynamics	16	ATLAS: Advanced Trough with Lower-Cost System Architecture	Patrick Marcotte
Oregon State University	37	High-Flux Microchannel Receiver Development	Brian Fronk
General Electric	38	Compression System Design and Testing for sCO_2 CSP Operation	Jason Mortzheim
Southwest Research Institute	39	Development of an Integrally Geared Compressor-Expander for sCO_2 Brayton Cycle Power Generation Applications	Jason Wilkes
University of Wisconsin	40	Advanced Supercritical Carbon Dioxide Cycles	Mark Anderson
Georgia Tech	41	Sodium Ion Expansion Engine Power Block for Distributed CSP	Shannon Yee
Purdue University	59	Robust, Cost-Effective Heat Exchangers for 800°C Operation with Supercritical CO_2	Kenneth Sandhage
Brayton Energy	75	Integrated Solar Receiver with Thermal Storage for an sCO_2 Power Cycle	Shaun Sullivan
Agira	17	Unique Single-Axis Tracking Planar Waveguide Optical Collector for CSP Modules	Bal Mukund Dhar
University of California, San Diego	18	Dielectric Metasurface Concentrators	Boubacar Kante
Hyperlight Energy	19	Low-Cost Concentrated Solar Power Collector	Greg Mungas

SETO CSP AWARDEE POSTERS

Awardee	Poster #	Project Title	PI Name
Solar Dynamics	20	Drop C: The Drop-in, Ring-of-Power Heliostat	Kyle Kattke
National Renewable Energy Laboratory	21	Full-Scale Hydrogen Mitigation Installation and Testing at Nevada Solar One	Greg Glatzmaier
National Renewable Energy Laboratory	22	Deployment of the Aerial Distant Observer Tool to Survey Optical Performance of CSP Parabolic Trough Solar Fields	Guangdong Zhu
Solar Dynamics	34	SMART Molten Salt Trough: Simplified Melting and Rotation-Join Technology for Molten Salt Troughs	Keith Gawlik
Southwest Research Institute	36	Development of a High-Efficiency Hot Gas Turbo-Expander and Low-Cost Heat Exchangers for Optimized Concentrating Solar Power Applications	Jeff Moore
Sporian Microsystems	45	High-Temperature, Raman-Spectroscopy-Based, Inline, Molten Salt Composition Monitoring System for Concentrating Solar Power Systems	Kevin Harsh
National Renewable Energy Laboratory	47	Stress Relaxation Cracking (SRC) of Alloys at Temperatures Higher than 540°C	Judith Vidal
University of California, Los Angeles	53	High-Operating Temperature Liquid Metal Heat Transfer Fluids	Sungtaek Ju
LM Group Holdings	65	Novel Corrosion and Erosion Protective Amorphous Alloys Coatings	Evelina Vogli
Los Alamos National Laboratory	70	Binary Metal Chalcogenides for High-Temperature Thermal Storage	Stephen Obrey
Echogen Power Systems	74	sCO_2 Power Cycle with Integrated Thermochemical Energy Storage	Timothy Held
National Renewable Energy Laboratory	26	Development and Validation of a Xenon Arc Lamp Accelerated Aging Method for CSP Solar Mirrors	Robert Tirawat
Sandia National Laboratories	27	Universal Field Assessment and Survey Tool	Julius Yellowhair
National Renewable Energy Laboratory	28	Optical Facilities Support	Judy Netter
National Renewable Energy Laboratory	29	CSP Plant Construction, Start-Up, and O&M Best Practices Study	Mark Mehos
Sandia National Laboratories	30	National Solar-Thermal Test Facility Operations and Maintenance	Joshua Christian
National Renewable Energy Laboratory	31	Solar for Industrial Process Heat	Robert Margolis
National Renewable Energy Laboratory	32	Value and Operational Performance of Solar Plus Storage Power Plants	Paul Denholm
National Renewable Energy Laboratory	33	CSP Systems Analysis	Craig Turchi
Argonne National Laboratory	56	Low-Cost High-Temperature Ceramic Heat Exchangers	Dileep Singh
Oak Ridge National Laboratory	64	Cast Components for High-Temperature CSP Thermal Systems	Govindarajan Muralidharan
National Renewable Energy Laboratory	71	Integrated Heat Pumps Thermal Storage and Power Cycle for CSP	Joshua McTigue
National Renewable Energy Laboratory	72	Real-Time Operations Optimization Software	Michael Wagner
Sandia National Laboratories	73	Solar Thermochemical Ammonia Production (STAP)	Andrea Ambrosini
University of Michigan	23	Robust and Spectrally-Selective Aerogels for Solar Receivers	Andrej Lenert
Sundog	24	Development of a Front-Surface CSP Reflector	Randy Gee
Lucent	25	Focusing Mirrors for Concentrating Solar Power	Sergey Vasylyev
University of Arizona	46	Sensing and Arresting Metal Corrosion in Molten Chloride Salts at 800°C	Dominic Gervaiso
Dartmouth	54	Thermodynamically Stable, Plasmonic Transition Metal Oxide Nanoparticle Solar Selective Absorbers	Jifeng Liu
University of Utah	55	Volumetrically Absorbing Thermal Insulator (VATI) for Monolithic High-Temperature Microchannel Receiver Modules	Sameer Rao
CompRex	57	740H Diffusion-Bonded Compact Heat Exchanger for High-Temperature and Pressure Applications	Zhijun Jia
University of California, Davis	58	Additively-Manufactured Molten Salt-sCO_2 Heat Exchanger	Vinod Narayanan

SETO CSP Poster Session

SETO CSP AWARDEE POSTERS

Awardee	Poster #	Project Title	PI Name
Purdue University	61	Mitigation of Molten Salt Corrosion	Kenneth Sandhage
Purdue University	62	Mechanically, Thermally, and Chemically-Robust High-Temperature Ceramic Composites	Kenneth Sandhage
University of California, San Diego	63	High-Entropy Ceramic Coatings: Transformative New Materials for Environmentally-Compatible Thin-Film Insulators	Jian Luo
Colorado School of Mines	82	Narrow-Channel, Fluidized Beds for Effective Particle Thermal Energy Transport and Storage	Gregory Jackson
Sandia National Laboratories	35	Design and Implementation of a 1-3 MW_{th} sCO_2 Support Loop for Maturation of Molten Salt, Particulate, and Gas Phase Thermal Storage Primary Heat Exchangers	Matt Carlson
National Renewable Energy Laboratory	42	Liquid-Phase Pathway to Sunshot	Craig Turchi
Georgia Tech	43	Thermophysical Property Measurements of Heat Transfer Media and Containment Materials	Shannon Yee
Rensselaer Polytechnic	44	Development of In-Situ Corrosion Kinetics and Salt Property Measurements	Li Liu
National Renewable Energy Laboratory	48	Molten Chloride Thermophysical Properties, Chemical Optimization, and Purification	Judith Vidal
Savannah River National Laboratory	49	Full-Loop Thermodynamic Corrosion Inhibition and Sensing in Molten Chloride Systems	Brenda Garcia-Diaz
Oak Ridge National Laboratory	50	Progression to Compatibility Evaluations in Flowing Molten Salts	Bruce Pint
Oak Ridge National Laboratory	51	Comparison of Protecting Layer Performance for Corrosion Inhibition in Molten Chloride Salts Through Interfacial Studies at the Molecular Scale	Sheng Dai
Oak Ridge National Laboratory	52	Enabling High-Temperature Molten Salt CSP Through the Facility to Alleviate Salt Technology Risks (FASTR)	Kevin Robb
Purdue University	60	Robust High-Temperature Heat Exchangers	Kenneth Sandhage
Hayward Tyler	66	Development of High-Temperature Molten Salt Pump Technology for Gen3 Solar Power Tower Systems	Keith Oldinski
Massachusetts Institute of Technology	67	High-Temperature Pumps and Valves for Molten Salt	Asegun Henry
Massachusetts Institute of Technology	68	Ceramic Castable Cement Tanks and Piping for Molten Salt	Asegun Henry
Powdermet	69	High-Toughness Cermets for Molten Salt Pumps	Joseph Hensel
Brayton Energy	76	Gen3 Gas-Phase System Development and Demonstration	Shaun Sullivan
Brayton Energy	77	Integrated Thermal Energy Storage Heat Exchanger for Concentrating Solar Power Applications	Jim Nash
Mohawk Innovative Technology	78	Oil-Free, High-Temperature Heat Transfer Fluid Circulator	Hooshang Heshmat
Sandia National Laboratories	79	Particle Pilot Plant (G3P3): Integrated High-Temperature Particle System for CSP	Cliff Ho
Sandia National Laboratories	80	Characterization of Radiative, Convective, and Particle Losses in High-Temperature Particle Receivers	Cliff Ho
Sandia National Laboratories	81	Characterization and Mitigation of Radiative, Convective, and Particle Losses in High-Temperature Particle Receivers	Cliff Ho
Idaho National Laboratory	83	Creep-Fatigue Behavior and Damage Accumulation of a Candidate Structural Material for Concentrating Solar Power Solar-Thermal Receiver	Michael McMurtrey
Electric Power Research Institute	84	Improving Economics of Gen3 CSP System Components through Fabrication and Application of High-Temperature Nickel-Based Alloys	John Shingledecker
Sandia National Laboratories	85	Quantifying thermophysical Properties and Durability of Particles and Materials for Direct and Indirect Heat Transfer Mechanisms	Kevin Albrecht
University of Tulsa	86	GEN3D Experimental and Numerical Development of Gen3 Durability Life Models	Todd Otanicar
Georgia Tech	87	Advanced Characterization of Particulate Flows for Concentrating Solar Power Applications	Peter Loutzenhiser
University of California, San Diego	88	Non-Contact Thermophysical Characterization of Solids and Fluids for Concentrating Solar Power	Renkun Chen

U.S. DEPARTMENT OF
ENERGY

Office of
ENERGY EFFICIENCY &
RENEWABLE ENERGY

For more information, visit:
energy.gov/eere/solar

March 2019
Printed with a renewable-source ink on paper containing at least 50% wastepaper, including 10% post consumer waste.