

## DOE Hydrogen and Fuel Cells Program 2020 AMR Project Portfolio

Hydrogen Fuel R&D Projects		
<i>Invited Oral Presentations</i>		
P148	HydroGEN Overview: A Consortium on Advanced Water Splitting Materials	Huyen Dinh, National Renewable Energy Laboratory
P148A	HydroGEN: Low-Temperature Electrolysis (LTE) and LTE/Hybrid Supernode	Guido Bender, National Renewable Energy Laboratory
P148B	HydroGEN: High-Temperature Electrolysis Supernode	Gary Groenewold, Idaho National Laboratory
P148C	HydroGEN: Photoelectrochemical (PEC) Hydrogen Production and PEC and OER Supernodes	James Young, National Renewable Energy Laboratory
P148D	HydroGEN: Solar Thermochemical Hydrogen (STCH) and STCH Supernode	Anthony McDaniel, Sandia National Laboratories
P170	Benchmarking Advanced Water Splitting Technologies: Best Practices in Materials Characterization	Kathy Ayers, Proton OnSite
P165	Accelerated Discovery of STCH Hydrogen Production Materials via High-Throughput Computational and Experimental Methods	Ryan O'Hayre, Colorado School of Mines
P166	Computationally Accelerated Discovery and Experimental Demonstration of High-Performance Materials for Advanced STCH Hydrogen Production	Charles Musgrave, University of Colorado Boulder
P167	Transformative Materials for High-Efficiency Thermochemical Production of Solar Fuels	Chris Wolverton, Northwestern University
P175	Intermediate Temperature Proton-Conducting Solid Oxide Electrolysis Cells with Improved Performance and Durability	Xingbo Liu, West Virginia University
P176	Development of Durable Materials for Cost Effective Advanced Water Splitting Utilizing All Ceramic Solid Oxide Electrolyzer Stack Technology	John Pietras, Saint-Gobain
P177	Proton-Conducting Ceramic Electrolyzers for High-Temperature Water Splitting	Hossein Ghezal-Ayagh, FuelCell Energy, Inc.
P179	BioHydrogen (BioH <sub>2</sub> ) Consortium to Advance Fermentative Hydrogen Production	Pin-Ching Maness, National Renewable Energy Laboratory
P102	Analysis of Advanced Hydrogen Production and Delivery Pathways	Brian James, Strategic Analysis, Inc.
P178	Industrially Scalable Waste CO <sub>2</sub> Reduction to Useful Chemicals and Fuels	Todd Deutsch, National Renewable Energy Laboratory
ST001	System Level Analysis of Hydrogen Storage Options	Rajesh Ahluwalia, Argonne National Laboratory
ST100	Hydrogen Storage Cost Analysis	Cassidy Houchins, Strategic Analysis, Inc.
ST146	Precursor Processing Development for Low Cost, High Strength Carbon Fiber for Composite Overwrapped Pressure Vessel Applications	Matthew Weisenberger, University of Kentucky
ST147	Developing a New Polyolefin Precursor for Low-Cost, High-Strength Carbon Fiber	Mike Chung, Penn State University
ST148	Novel Plasticized Melt Spinning Process of PAN Fibers Based on Task-Specific Ionic Liquids	Sheng Dai, Oak Ridge National Laboratory
ST127	HyMARC: A Consortium for Advancing Hydrogen Storage Materials	Mark Allendorf, Sandia National Laboratories, and Tom Gennett, National Renewable Energy Laboratory
ST204	HyMARC: Hydrogen Carriers R&D Activities for Bulk Hydrogen Storage and Transport	Tom Autrey, Pacific Northwest National Laboratory
ST207	HyMARC Core Activity: Computational Modeling	Brandon Wood, Lawrence Livermore National Laboratory
ST138	HyMARC Seedling: Development of Magnesium Boride Etherates as Hydrogen Storage Materials	Godwin Severa, University of Hawaii
<i>Invited Poster Presentations</i>		
P129	Novel Hybrid Microbial Electrochemical System for Efficient Hydrogen Generation from Biomass	Hong Liu, Oregon State University
P143	High Temperature Alkaline Water Electrolysis	Hui Xu, Giner, Inc.
P152	Proton-Conducting Solid Oxide Electrolysis Cells for Large-Scale Hydrogen Production at Intermediate Temperatures	Prabhakar Singh, University of Connecticut
P153	Degradation Characterization and Modeling of a New Solid Oxide Electrolysis Cell Utilizing Accelerated Life Testing	Scott Barnett, Northwestern University

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P154	Thin-Film, Metal-Supported High-Performance and Durable Proton-Solid Oxide Electrolyzer Cell	Tianli Zhu, United Technologies Research Center
P155	High Efficiency PEM Water Electrolysis Enabled by Advanced Catalysts, Membranes, and Processes	Kathy Ayers, Proton OnSite
P156	Developing Novel Platinum Group Metal-Free Catalysts for Alkaline Hydrogen and Oxygen Evolution Reactions	Sanjeev Mukerjee, Northeastern University
P157	PGM-Free OER Catalysts for PEM Electrolyzer	Di-Jia Liu, Argonne National Laboratory
P158	High-Performance Ultralow-Cost Non-Precious Metal Catalyst System for AEM Electrolyzer	Hoon Chung, Los Alamos National Laboratory
P159	Scalable Elastomeric Membranes for Alkaline Water Electrolysis	Yu Seung Kim, Los Alamos National Laboratory
P160	Best-in-Class Platinum Group Metal-Free (PGM-Free) Catalyst Integrated Tandem Junction PEC Water Splitting Devices	Charles Dismukes, Rutgers University
P161	Protective Catalyst Systems on III-V and Si-Based Semiconductors for Efficient, Durable Photoelectrochemical Water Splitting Devices	Thomas Jaramillo, Stanford University
P162	Novel Chalcopyrites for Advanced PEC Water Splitting	Nicolas Gaillard, University of Hawaii
P163	Monolithically Integrated Thin-Film/Silicon Tandem Photoelectrodes for High Efficiency and Stable PEC Water Splitting	Zetian Mi, University of Michigan
P168	Mixed Ionic Electronic Conducting Quaternary Perovskites: Materials by Design for STCH Hydrogen	Ellen Stechel, Arizona State University
P183	Extremely Durable Concrete using Methane Decarbonization Nanofiber Co-Products with Hydrogen	Alan W. Weimer, University of Colorado Boulder
P184	Scalable and Highly-Efficient Microbial Electrochemical Reactor for Hydrogen Generation from Lignocellulosic Biomass and Waste	Hong Liu, Oregon State University
P185	High-Performance AEM LTE with Advanced Membranes, Ionomers, and PGM-Free Electrodes	Paul A. Kohl, Georgia Institute of Technology
P186	Performance and Durability Investigation of Thin, Low Crossover Proton Exchange Membranes for Water Electrolyzers	Andrew Park, The Chemours Company FC, LLC
P187	Pure Hydrogen Production through Precious-Metal-Free Membrane Electrolysis of Dirty Water	Shannon Boettcher, University of Oregon
P188	Advanced Coatings to Enhance the Durability of SOEC Stacks	Neil Kidner, Nexceris, LLC
P189	Scalable High-Hydrogen Flux, Robust Thin Film Solid Oxide Electrolyzer	Colin Gore, Redox Power Systems, LLC
P190	A Multifunctional Isostructural Bilayer Oxygen Evolution Electrode for Durable Intermediate-Temperature Electrochemical Water Splitting	Kevin Huang, University of South Carolina
P191	Perovskite/Perovskite Tandem Photoelectrodes For Low-Cost Unassisted Photoelectrochemical Water Splitting	Yanfa Yan, The University of Toledo
P192	Development of Composite Photocatalyst Materials that Are Highly Selective for Solar Hydrogen Production and Their Evaluation in Z-Scheme Reactor Designs	Shane Ardo, University of California, Irvine
P193	Highly Efficient Solar Water Splitting Using 3D/2D Hydrophobic Perovskites with Corrosion Resistant Barriers	Aditya D. Mohite, William Marsh Rice University
P194	New High-Entropy Perovskite Oxides with Increased Reducibility and Stability for Thermochemical Hydrogen Generation	Jian Luo, University of California, San Diego
P195	A New Paradigm for Materials Discovery and Development for Lower Temperature and Isothermal Thermochemical Hydrogen Production	Jonathan Scheffe, University of Florida
ST008	Hydrogen Storage System Modeling: Public Access, Maintenance, and Enhancements	Matt Thornton, National Renewable Energy Laboratory
ST137	HyMARC Seedling: Electrolyte Assisted Hydrogen Storage Reactions	Dan Addison, Liox Power
ST140	Emergency Hydrogen Refueler for Individual Consumer Fuel Cell Vehicles	Daniel Carr, Skyhaven Systems
ST143	HyMARC Seedling: ALD (Atomic Layer Deposition) Synthesis of Novel Nanostructured Metal Borohydrides	Steven Christensen, National Renewable Energy Laboratory
ST144	HyMARC Seedling: Optimized Hydrogen Adsorbents via Machine Learning and Crystal Engineering	Don Siegel, University of Michigan
ST202	HyMARC Core Activity: Sorbents	Tom Gennett, National Renewable Energy Laboratory

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ST203	HyMARC Core Activity: Metal Hydrides	Mark Allendorf, Sandia National Laboratories
ST204	HyMARC: Hydrogen Carriers R&D Activities for Bulk Hydrogen Storage and Transport	Tom Autrey, Pacific Northwest National Laboratory
ST205	HyMARC Core Activity: Characterization	Philip Parilla, National Renewable Energy Laboratory
ST206	HyMARC Core Activity: Data Hub	Courtney Pailing, National Renewable Energy Laboratory
ST207	HyMARC Core Activity: Computational Modeling	Brandon Wood, Lawrence Livermore National Laboratory
ST208	HyMARC: Metal Hydrides for Stationary Storage Applications	Tae Wook Heo, Lawrence Livermore National Laboratory
ST209	Theory-Guided Design and Discovery of Materials for Reversible Methane and Hydrogen Storage	Omar Farha, Northwestern University
ST210	Metal-Organic Frameworks Containing Frustrated Lewis Pairs for Hydrogen Storage at Ambient Temperature	Shengqian Ma, University of South Florida
ST211	HyMARC Seedling: Optimal Adsorbents for Low-Cost Storage of Natural Gas and Hydrogen: Computational Identification, Experimental Demonstration, and System-Level Projection	Don Siegel, University of Michigan
ST212	Methane and Hydrogen Storage with Porous Cage-Based Composite Materials	Eric Bloch, University of Delaware
ST213	Uniting Theory and Experiment to Deliver Flexible MOFs for Superior Methane (NG) Storage	Brian Space, University of South Florida
ST214	Heteroatom-Modified and Compacted Zeolite-Templated Carbons for Gas Storage	Nicholas Stadie, Montana State University
ST215	Developing New NG Super-Absorbent Polymer	Mike Chung, Penn State University
ST216	Hydrogen Release from Concentrated Media with Reusable Catalysts	Travis Williams, University of Southern California
ST217	A Reversible Liquid Hydrogen Carrier System Based on Ammonium Formate and Captured CO <sub>2</sub>	Hongfei Lin, Washington State University
ST218	High Capacity Step-Shaped Hydrogen Adsorption in Robust, Pore-Gating Zeolitic Imidazolate Frameworks	Michael McGuirk, Colorado School of Mines
ST220	SBIR: General Techniques for Increasing Packing Density of Metal-Organic Frameworks for Enhanced Volumetric Storage of Hydrogen	William Morris, NuMat
ST221	SBIR: Highly Efficient Smart Tanks for Hydrogen Storage	Ambalavanan Jayaraman, TDA Research, Inc.

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Fuel Cell R&D Projects		
<i>Invited Oral Presentations</i>		
FC160	ElectroCat (Electrocatalysis Consortium)	Deborah Myers, Argonne National Laboratory, and Piotr Zelenay, Los Alamos National Laboratory
FC170	ElectroCat: Durable Mn-Based PGM-Free Catalysts for Polymer Electrolyte Membrane Fuel Cells	Hui Xu, Giner, Inc.
FC171	ElectroCat: Advanced PGM-Free Cathode Engineering for High Power Density and Durability	Shawn Litster, Carnegie Mellon University
FC172	ElectroCat: Highly Active and Durable PGM-Free ORR Electrocatalysts through the Synergy of Active Sites	Yuyan Shao, Pacific Northwest National Laboratory
FC302	Developing Platinum Group Metal-Free Catalysts for Oxygen Reduction Reaction in Acid: Beyond the Single Metal Site	Qingying Jia, Northeastern University
FC303	Mesoporous Carbon-Based PGM-Free Catalyst Cathodes	Jian Xie, Indiana University Purdue University
FC304	Fuel Cell Membrane Electrode Assemblies with PGM-Free Nanofiber Cathodes	Peter Pintauro, Vanderbilt University
FC305	Active and Durable PGM-Free Cathodic Electrocatalysts for Fuel Cell Application	Alexey Serov, Pajarito Powder
FC306	High Performance Non-PGM Transition Metal Oxide ORR Catalysts of PEMFCs	Timothy Davenport, United Technologies Research Center
FC318	ElectroCat: Accessible PGM-Free Catalysts and Electrodes	Jacob Spendelow, Los Alamos National Laboratory
FC307	Cyclic Olefin Copolymer-Based Alkaline Exchange Polymers and Reinforced Membranes	Chulsung Bae, Rensselaer Polytechnic Institute
FC308	Advanced AEMs with Tunable Water Transport for PGM-Free AEMFCs	Michael Hickner, Pennsylvania State University
FC312	Molten Hydroxide Dual-Phase Membranes for Intermediate Temperature Anion Exchange Membrane Fuel Cells	Patrick Campbell, Lawrence Livermore National Laboratory
FC320	Electrode Ionomers for High Temperature Fuel Cells	Michael Hibbs, Sandia National Laboratories
FC135	FC-PAD: Fuel Cell Performance and Durability Consortium	Rod Borup, Los Alamos National Laboratory, and Adam Weber, Lawrence Berkeley National Laboratory
FC163	Fuel Cell Systems Analysis	Brian James, Strategic Analysis, Inc.
FC017	Fuel Cell System Modeling and Analysis	Rajesh Ahluwalia, Argonne National Laboratory
FC309	PILBCP-IL Composite Ionomers for High Current Density Performance	Joshua Snyder, Drexel University
FC310	Composite PEMs from Electrospun Crosslinkable Poly(Phenylene Sulfonic Acid)s	Ryszard Wycisk, Vanderbilt University
FC161	Advanced Electrocatalysts through Crystallographic Enhancement	Jacob Spendelow, Los Alamos National Laboratory
FC332	Reversible Fuel Cell Cost Analysis	Max Wei, Lawrence Berkeley National Laboratory
FC313	Novel Bifunctional Electrocatalysts, Supports, and Membranes for High Performing and Durable Unitized Regenerative Fuel Cells	Nem Danilovic, Lawrence Berkeley National Laboratory
FC316	Durable, High-Performance Unitized Reversible Fuel Cells Based on Proton Conductors	Meilin Liu, Georgia Institute of Technology
FC314	Efficient Reversible Operation and Stability of Novel Solid Oxide Cells	Scott Barnett, Northwestern University
FC315	High-Efficiency Reversible Alkaline Membrane Fuel Cells	Hui Xu, Giner, Inc.
FC317	Stationary Direct Methanol Fuel Cells Using Pure Methanol	Xianglin Li, University of Kansas Center for Research, Inc.
<i>Invited Poster Presentations</i>		
FC105	Novel Structured Metal Bipolar Plates for Low Cost Manufacturing	C.H. Wang, TreadStone Technologies, Inc.
FC117	FY18 SBIR IIB: Ionomer Dispersion Impact on PEM Fuel Cell and Electrolyzer Durability	Hui Xu, Giner, Inc.

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Fuel Cell R&D Projects		
FC144	Highly Accessible Catalysts for Durable High-Power Performance	Anusorn Kongkanand, General Motors
FC145	Corrosion-Resistant Non-Carbon Electrocatalyst Supports for PEFCs	Vijay Ramani, Washington University
FC156	Durable High-Power Membrane Electrode Assembly with Low Platinum Loading	Swami Kumaraguru, General Motors
FC157	High Performance PEFC Electrode Structures	Rob Darling, United Technologies Research Center
FC158	Fuel Cell Membrane Electrode Assemblies with Ultra-Low Pt Nanofiber Electrodes	Peter Pintauro, Vanderbilt University
FC162	Vapor Deposition Process for Engineering of Dispersed PEMFC ORR Pt/NbO <sub>x</sub> /C Catalysts	Jim Waldecker, Ford Motor Co.
FC167	FY18 SBIR Phase II Release 1: Multi-Functional Catalyst Support	Minette Ocampo, pH Matter, LLC
FC174	Highly Efficient and Durable Cathode Catalyst with Ultralow Pt Loading through Synergetic Pt/PGM-Free Catalytic Interaction	Di-Jia Liu, Argonne National Laboratory
FC178	Spirocyclic Anion Exchange Membranes for Improved Performance and Durability	Bryan Pivovar, National Renewable Energy Laboratory
FC180	High Performing and Durable Pyrophosphate Based Composite Membranes for Intermediate Temperature Fuel Cells	Cortney Kreller, Los Alamos National Laboratory
FC181	Microstructured Electrodes and Diffusion Layers for Enhanced Transport in Reversible Fuel Cells	Jacob Spendelow, Los Alamos National Laboratory
FC182	Bipolar Membrane Development to Enable Regenerative Fuel Cells	Todd Deutsch, National Renewable Energy Laboratory
FC301	Membrane Working Group	Bryan Pivovar, National Renewable Energy Laboratory, and Yu Seung Kim, Los Alamos National Laboratory
FC319	Low Cost Gas Diffusion Layer Materials and Treatments for Durable High Performance PEM Fuel Cells	Rod Borup, Los Alamos National Laboratory
FC321	Solid Phase Processing for Reduced Cost and Improved Efficiency of Bipolar Plates	Ken Ross, Pacific Northwest National Laboratory
FC322	PEFC Electrode Structures with Encased Catalysts to Eliminate Ionomer Adsorption on Catalytic Sites	Deborah Myers, Argonne National Laboratory
FC323	Durable Fuel Cell MEA through Immobilization of Catalyst Particle and Membrane Chemical Stabilizer	Nagappan Ramaswamy, General Motors LLC
FC324	Reversible Fuel Cell Stacks with Integrated Water Management	Corky Mittelsteadt, Giner, Inc.
FC325	FY19 SBIR II: Controlled Porosity and Surface Coatings for Advanced Gas Diffusion Layers	Christopher Lang, Physical Sciences, Inc.
FC326	Durable MEAs for Heavy-Duty Fuel Cell Electric Trucks	Vivek Murthi, Nikola Motor Company
FC327	Durable High Power Density Fuel Cell Cathodes for Heavy-Duty Vehicles	Shawn Litster, Carnegie Mellon University
FC328	FY19 SBIR II: Novel Fluorinated Ionomer for PEM Fuel Cells	Hui Xu, Giner, Inc.
FC329	Fuel Cell System Optimization for Rail and Maritime Applications	Rajesh Ahluwalia, Argonne National Laboratory
FC330	High Efficiency Reversible Solid Oxide System	Hossein Ghezeli-Ayagh, FuelCell Energy, Inc.
FC331	A Novel Stack Approach to Enable High Round Trip Efficiencies in Unitized PEM Regenerative Fuel Cells	Katherine Ayers, Proton Energy Systems

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Infrastructure and Systems R&D Projects		
Invited Oral Presentations		
TA009	Maritime (Pierside Power) Fuel Cell Generator Project	Lennie Klebanoff, Sandia National Laboratories
TA016	Fuel Cell Hybrid Electric Delivery Van	Jason Hanlin, Center for Transportation and the Environment
TA017	Innovative Advanced Hydrogen Mobile Fueler	Sara Odom, Electricore
TA029	Autonomous Hydrogen Fueling Station	Dustan Skidmore, Plug Power, Inc.
IN023	Fueling Station Component Validation	Genevieve Saur, National Renewable Energy Laboratory
IN001	H-Mat Overview: Metals	Chris San Marchi, Sandia National Laboratories
IN011	Coatings for Compressor Seals	Chris Thompson, GVD Corporation
IN008	Dispenser Reliability	Michael Peters, National Renewable Energy Laboratory
IN010	Cryogenically Flexible, Low Permeability Hydrogen Delivery Hose	Jennifer Lalli, NanoSonic
IN013	Dispenser Reliability: Materials R&D	Nalini Menon, Sandia National Laboratories
IN004	Magnetocaloric Hydrogen Liquefaction	John Barclay, Pacific Northwest National Laboratory
IN012	Low-Cost Magnetocaloric Materials Discovery	Robin Ihnfeldt, General Engineering & Research
IN015	Heisenberg Vortex Tube Cooling and Liquefaction	Jacob Leachman, Washington State University
IN016	Free-Piston Expander for Hydrogen Cooling	Devin Halliday, Gas Technology Institute
SA172	Hydrogen Demand Analysis for H2@Scale	Amgad Elgowainy, Argonne National Laboratory
SA171	H2@Scale Analysis	Mark Ruth, National Renewable Energy Laboratory
SA173	Energy Storage Analysis	Chad Hunter, National Renewable Energy Laboratory
SA170	Impact of Hydrogen Onboard Storage Selection on the Cost of Fueling Fuel Cell Heavy Duty Vehicles	Amgad Elgowainy, Argonne National Laboratory
SA169	Market Segmentation Analysis of Medium and Heavy Duty Trucks with a Fuel Cell Emphasis	Chad Hunter, National Renewable Energy Laboratory
SA174	Synthetic Fuels Technoeconomic Analysis and Life Cycle Analysis	Amgad Elgowainy, Argonne National Laboratory
TA034	Rail and Maritime Metrics	Rajesh Ahluwalia, Argonne National Laboratory
TA001	MEA Manufacturing R&D	Michael Ulsh, National Renewable Energy Laboratory
TA005	In-Line Quality Control of PEM Materials	Andrew Wagner, Mainstream Engineering
TA007	Roll-to-Roll Advanced Materials Manufacturing Lab Collaboration	Claus Daniel, Oak Ridge National Laboratory
TA008	Material-Process-Performance Relationships in PEM Catalyst Inks and Coated Layers	Scott Mauger, National Renewable Energy Laboratory
TA025	Laser 3D Printing of Highly Compacted Protonic Ceramic Electrolyzer Stack	Jianhua "Joshua" Tong, Clemson University
TA026	Low-Cost, High Performance Catalyst Coated Membranes for PEM Water Electrolyzers	Andrew Steinbach, 3M
TA027	Catalyst Layer Design, Manufacturing, and In-Line Quality Control	Radenka Maric, University of Connecticut
TA013	Fuel Cell Bus Evaluations	Leslie Eudy, National Renewable Energy Laboratory

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Infrastructure and Systems R&D Projects		
TA018	High Temperature Electrolysis Test Stand	James O'Brien, Idaho National Laboratory
TA024	Analysis of Fuel Cells for Trucks: Real-World Benefits	Ram Vijayagopal, Argonne National Laboratory
TA033	Developing Novel Electrodes with Ultralow Catalyst Loading for High Efficiency Hydrogen Production in Proton Exchange Membrane Electrolyzer Cells	Feng-Yuan Zhang, University of Tennessee Space Institute
TA032	Electrolyzer Integrated Modular Nano-Array Monolithic Catalytic Reactors	Trent Molter, Skyre, Inc.
TA031	Anode-Boosted Electrolysis	Monjid Hamdan, Giner ELX, Inc.
<i>Invited Poster Presentations</i>		
IN014	NDE Techniques for Pressure Vessels	Matthew Webster, Luna Innovations
IN019	Ultra-Cryopump for High Demand Transportation Fueling	Kyle Gross, Air Products and Chemicals, Inc.
IN020	Self-Healable Copolymer Composites for Extended Service Hydrogen Dispensing Hoses	Marek Urban, Clemson University
IN021	Microstructural Engineering and Accelerated Test Method Development to Achieve Low Cost, High Performance Solutions for Hydrogen Storage and Delivery	Kip Findley, Colorado School of Mines
IN022	Tailoring Carbide Dispersed Steels: A Path to Increased Strength and Hydrogen Tolerance	Gregory Thompson, The University of Alabama
SA175	Regional Hybrid Energy Systems Technoeconomic Analysis	Richard Boardman, Idaho National Laboratory
TA019	Modular SOEC System for Efficient Hydrogen Production at High Current Density	Hossein Ghezal-Ayagh, FuelCell Energy, Inc.
TA028	Demonstration of Electrolyzer Operation at a Nuclear Plant to Allow for Dynamic Participation in an Organized Electricity Market and In-House Hydrogen Supply	Uuganbayar Otgonbaatar, Exelon
TA030	Demonstration of Integrated Hydrogen Production and Consumption for Improved Utility Operations	Monjid Hamdan, Giner ELX, Inc.
TA035	Power Convertor for Electrolyzer Applications	Robert Hovsapien, National Renewable Energy Laboratory
TA036	Advanced Electrode Manufacturing to Enable Low Cost PEM Electrolysis	Chris Capuano, Nel Hydrogen
TA037	Demonstration and Framework for H2@Scale in Texas and Beyond	Nico Bouwkamp, Frontier Energy Inc.
H2000	H2@Scale Overview	Bryan Pivovar, National Renewable Energy Laboratory
H2006	Membrane Electrode Assembly Manufacturing Automation Technology for the Electrochemical Compression of Hydrogen	Michael Ulsh, National Renewable Energy Laboratory
H2011	Risk Assessment and Ventilation Modeling to Improve Hydrogen Fuel Cell Vehicle Repair Garages	Brian Ehrhart, Sandia National Laboratories
H2013	Development, Validation, and Benchmarking of Quantitative Risk Assessment Tools for Hydrogen Refueling Stations	Ethan Hecht, Sandia National Laboratories
H2026	Hybrid Electrical/Thermal Hydrogen Production Process Integrated with a Molten Salt Reactor Nuclear Power Plant	Elise Fox, Savannah River National Laboratory
H2041	California Hydrogen Infrastructure Research Consortium	Sam Sprik, National Renewable Energy Laboratory
H2042	Hydrogen Contaminant Detector	Bill Buttner, National Renewable Energy Laboratory
H2045	Methane Pyrolysis for Base-Grown Carbon Nanotubes and CO <sub>2</sub> -Free Hydrogen over Transition Metal Catalysts	Robert Dagle, Pacific Northwest National Laboratory
H2057	Electrolyzer-Bioreactor Integration	Kevin Harrison, National Renewable Energy Laboratory
H2058	Toluene-Methylcyclohexane as Two-Way Carrier for Hydrogen Transmission and Storage	Rajesh Ahluwalia, Argonne National Laboratory
H2059	Electrolytic Renewable Fuel Production Optimal Operation Investigation	Josh Eichman, National Renewable Energy Laboratory

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Safety, Codes and Standards Projects		
<i>Invited Oral Presentations</i>		
SCS026	H-Mat Overview: Polymers	Kevin Simmons, Pacific Northwest National Laboratory
SCS005	R&D for Safety, Codes and Standards: Materials and Components Compatibility	Joe Ronevich, Sandia National Laboratories
SCS007	Fuel Quality Assurance R&D and Impurity Testing in Support of Codes & Standards	Tommy Rockward, Los Alamos National Laboratory
SCS010	R&D for Safety, Codes and Standards: Hydrogen Behavior	Ethan Hecht, Sandia National Laboratories
SCS019	Hydrogen Safety Panel, Safety Knowledge Tools, and First Responder Training Resources	Nick Barilo, Pacific Northwest National Laboratory
SCS021	National Renewable Energy Laboratory Hydrogen Sensor Testing Laboratory	William Buttner, National Renewable Energy Laboratory
SCS022	Fuel Cell and Hydrogen Energy Association Codes and Standards Support	Karen Quackenbush, Fuel Cell and Hydrogen Energy Association
<i>Invited Poster Presentations</i>		
SCS001	Component Failure R&D	Jacob Thorson, National Renewable Energy Laboratory
SCS011	Hydrogen Quantitative Risk Assessment	Brian Ehrhart, Sandia National Laboratories
SCS027	Guidance for Indoor Hydrogen Sensor Placement	Andrei Tchouvelev, A.V.Tchouvelev & Associates

## DOE Hydrogen and Fuel Cells Program 2020 AMR Project Portfolio

Interagency Projects		
<i>Invited Oral Presentations</i>		
AMO01	Advanced Manufacturing Office	Valri Lightner, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Advanced Manufacturing Office
BES01	Science Underpinning Hydrogen and Fuel Cells	John Vetrano, U.S. Department of Energy, Office of Science
FE01	Progress of the NETL Solid Oxide Fuel Cell Research Portfolio	Gregory Hackett, National Energy Technology Laboratory
FE02	SOFC Development at PNNL: Overview	John Hardy and Brian Koepfel, Pacific Northwest National Laboratory
FE03	Progress in SOFC Technology Development at FuelCell Energy	Hossein Ghezeli-Ayagh, FuelCell Energy, Inc.
FE04	Multi-Constituent Airborne Contaminants Capture with Low Cost Oxide Getters and Mitigation of Cathode Poisoning in SOFCs	Prabhakar Singh, University of Connecticut
NE01	Integrated Energy Systems for Hydrogen and Chemicals Production	Shannon Bragg-Sitton and Richard Boardman, Idaho National Laboratory
IA002A	Progress and Opportunities for Hydrogen and Fuel Cells in the State of Hawaii	Dave Molinaro, Hawaii Center for Advanced Transportation Technologies
IA002B	South Coast Air Quality Management District Program Overview	Joseph Impullitti, South Coast Air Quality Management District
IA003	From Mobility to Base Energy: Demonstrating Fuel Cells for Naval Facilities	David Cook, U.S. Navy
IA010A	Northeast Fuel Cell and Hydrogen Transportation Review	Charles Myers, Massachusetts Hydrogen Coalition
IA010B	Regional Update—Midwest	Pat Valente, Ohio Fuel Cell Coalition