

XIII. Acronyms, Abbreviations, and Definitions

α -AlH ₃	Alpha polymorph of aluminum hydride	3-D, 3D	Three-dimensional
~	Approximately	3DSM	Dimensionally stable membrane with 3-dimensional porous support
@	At		
°C	Degrees Celsius	3-L	Three-layer
°F	Degrees Fahrenheit	3-MPAB	3-methoxypropylamineborane
Δ	Change, delta	3-PPAB	3-phenylpropylamine-borane
ΔG	Gibbs free energy of reaction	3Q	Third quarter of the fiscal year
ΔH	Enthalpy of reaction, Enthalpy of hydrogenation	4Q	Fourth quarter of the fiscal year
ΔH_f°	Standard heat of formation	5-L	Five-layer
ΔK	Stress intensity factor	6FBPS0	Hexafluoro biphenol sulfone
ΔP	Pressure drop, pressure change	6FCN-x	Hexafluoro bisphenol A based disulfonated polybenzotrile (H+ form) (x denotes degree of sulfonation)
≈	Equals approximately		
>	Greater than	6FK	Hexafluoro ketone; Partially fluorinated poly(arylene ether ketone)
≥	Greater than or equal to		
<	Less than	6FPAEB	Hexafluoro bisphenol a benzotrile
≤	Less than or equal to	8YSZ	8 mol% yttria-stabilized zirconia
μ	Micro (one-millionth; 0.000001)	A	Ampere(s), amp(s)
μA	Microampere(s)	Å	Angstrom(s)
$\mu A/cm^2$	Microampere(s) per square centimeter	AAE	Adsorbent acceptability envelope
μc -Si	Microcrystalline silicon	AB	Ammonia-borane, NH ₃ BH ₃
μg	Microgram(s)	ABH ₂	Ammonium borohydride, NH ₄ BH ₄
μCHP	Micro-combined heat and power	AC	Alternating current; Activated carbon
μCHX	Microscale combustor/heat exchanger	ACF	Activated carbon fibers
μCHP	Micro-combined heat and power	A/cm ²	Amps per square centimeter
μm	Micrometer(s); micron(s)	ACN	Acetonitrile
μM	Micromolar	ACNT	Aligned carbon nanotube
μmol	Micromole(s)	ADG	Anaerobic digester gas
$\mu \Omega$ -cm ²	Micro-ohm(s)-square centimeter	AEM	Anion exchange membrane; Analytical electron microscopy
μV	Microvolt(s)	AEO	Annual Energy Outlook
η	Viscosity	AFDC	Alternative Fuels Data Center
#	Number	AFM	Atomic force microscopy; Anti-ferromagnetic
Ω	Ohm(s)	AFP	Automated fiber placement
Ω/cm^2	Ohm(s) per square centimeter	AFV	Alternative fuel vehicle
Ω -cm ²	Ohm-square centimeter(s)	Ag	Silver
%	Percent	AGC	Activated graphitic carbon
®	Registered trademark	AgCl	Silver chloride
\$	United States dollars	A-h	Amp-hour(s)
¹¹ B-NMR	Boron 11 nuclear magnetic resonance	AHJ	Authorities having jurisdiction
1-D, 1D	One-dimensional	AIISI	American Iron & Steel Institute
1Q	First quarter of the fiscal year	AIST	Japanese National Institute of Advanced Industrial Science and Technology
2-D, 2D	Two-dimensional		
2Q	Second quarter of the fiscal year	AK	Alkali

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a.k.a.	Also known as	ASTM	ASTM International, originally known as the American Society for Testing and Materials
Al	Aluminum	AT	Ammonia triborane
Al ₂ O ₃	Aluminum oxide	at%	Atomic percent
Al-AB	Aluminum-ammonia-borane	atm	Atmosphere(s)
AlCl ₃	Aluminum chloride	ATP	Adenosine triphosphate; Advanced Technology Program
ALD	Atomic layer deposition	ATPase	Adenosine triphosphatase
AlH ₃	Aluminum hydride; Alane	ATR	Autothermal reformer; Autothermal reforming; Attenuated total reflection
ALL-CRAFT	Alliance for Collaborative Research in Alternative Fuel Technology	ATR-FTIR	Attenuated total reflectance Fourier transform infrared
ALS	Advanced Light Source at Lawrence Berkeley National Laboratory	a.u.	Arbitrary units
ALT	Accelerated life test	Au	Gold
AM	Air mass	AuS	Gold sulfide
AM 1.5	Air Mass 1.5 solar illumination	AuSnO _x	Gold supported on hydrous tin oxide
AM1.5G	Air Mass 1.5 Global (solar spectrum)	AuTiO _x	Gold supported on titanium oxide
AMBH	Amine metal borohydride	Autonomie	Plug-and-Play Powertrain and Vehicle Model Architecture and Development Environment software model by Argonne National Laboratory to support the rapid evaluation of new powertrain/propulsion technologies for improving fuel economy through virtual design and analysis in a math-based simulation environment
AMC	Aminomethyl-cyclohexane	Avg	Average
AMFC	Anion exchange membrane fuel cell; Alkaline membrane fuel cell	AZO	Aluminum zinc oxide
AMR	Annual Merit Review	¹¹ B-NMR	Boron 11 nuclear magnetic resonance
AN	Acrylonitrile	B	Boron
ANL	Argonne National Laboratory	B ₂ O ₃	Boron oxide; Diboron trioxide
ANOVA	Analysis of variance	Ba	Barium
ANSI	American National Standards Institute	Bara	Bar absolute
A ₀	Arrhenius constant, ml/[cm ² -min-atm ^{1/2}]; Availability	barg	Bar gauge
APCI, APCi	Air Products and Chemicals, Inc.	BBC	4,4',4''-(benzene-1,3,5-triyl-tris(benzene-4,1-diyl))tribenzoate
APD	3-aminopropane-1,2-diol	BCC	Body-centered cubic
APR	Aqueous-phase reforming	BCN	Boron carbon nitride
APU	Auxiliary power unit	Be	Beryllium
AQMD	Air Quality Management District	BES	Basic Energy Sciences office within the DOE Office of Science
Ar	Argon	BET	Brunauer-Emmett-Teller surface area analysis method
AR	Areal resistance	BEV	Battery electric vehicle
ARPA-E	Advanced Research Projects Agency–Energy	BFZ0	BaFe _{0.975} Zr _{0.025} O ₃
ARRA	American Recovery and Reinvestment Act	BFZ1	BaFe _{0.90} Zr _{0.10} O ₃
As	Arsenic	BG-DW	65% bio-glycol-35% distilled water
ASAXS	Anomalous small-angle X-ray scattering	B-G	Boron doped graphitic material
a-Si	Amorphous silicon	B-H	Boron/hydrogen bond
a-SiC	Amorphous silicon carbide		
a-SiGe	Amorphous silicon germanium		
a-SiN	Amorphous silicon nitride		
ASME	American Society of Mechanical Engineers		
ASPEN	Modeling software, computer code for process analysis		
ASR	Area-specific resistance		
AST	Accelerated stress test		

B-H, BH, BH ₄	Borohydride	BPY	4,4'-bipyridine
BHP	Butyl perhydropyrolidine	Br	Bromine
Bi	Bismuth	Br ₂	Diatomic bromine
bmimBF ₄	1-butyl-3-methyl-imidazolium tetrafluoroborate	BTB	1,3,5-benzenetricarboxylate
bmimCl	1-butyl-3-methyl-imidazolium chloride	BTC	1,3,5-benzenetricarboxylate
bmimOTf	1-butyl-3-methyl-imidazolium triflate	BTE	4,4',4''-(benzene-1,3,5-triyltris(ethyne-2,1-diyl))tribenzoate
bmimPF ₆	1-butyl-3-methyl-imidazolium hexafluorophosphate	BTT	Benzene tris-tetrazole
BMPFFP	1-butyl-1-methyl-pyrrolidinium tris(pentafluoroethyl)trifluorophosphate	BTTC	Octa-carboxylate ligand
BN	Boron-nitrogen	BTU, Btu	British thermal unit(s)
BNH	Boron-nitrogen-hydrogen	Bu ₃ SnCl	Tributyltin chloride
BNHx	Dehydrogenated ammonia-borane	Bu ₃ SnSnBu ₃	Hexabutyl-distannane
BNL	Brookhaven National Laboratory	BV	Benzyl viologen
BNNT	Boron nitride nanotubes	BxHy	Polyhedral boranes
B-O	Any oxidized boron species, borate	BZYC	BaZr _{0.1} Ce _{0.7} Y _{0.1} Yb _{0.1} O _{3-δ}
Boc	Tert-butoxycarbonyl	C	Carbon
BOC	Best of class	C	Coulomb
B(OH) ₃	Boric acid	C ₂ H ₄	Ethylene
BOL	Beginning of life	C ₂ H ₆	Ethane
BOP, BoP	Balance of plant	C ₃ H ₈	Propane
BOT	Beginning of test	Ca	Calcium
BP	Bisphenol; Biphenyl	CA	Carbon aerogel; Chronoamperometry
bpe	Bis(4-pyridyl)ethane	CaBr ₂	Calcium bromide
BPEE	1,2-bipyridylethene	CaCO ₃	Calcium carbonate
BPDC	Biphenyl-4,4'-dicarboxylate	CAD	Computer-aided design
BPP	Bipolar plate	CAE	Computer-assisted engineering
BPPPO	Biphenol-based phenyl phosphine oxide	CAER	Center for Applied Energy Research
BPPPO-35	Biphenol-based phenyl phosphine oxide copolymer, 35% molar fraction of disulfonic acid unit (35% level of sulfonation)	CaFCP	California Fuel Cell Partnership
BPS	Ballard Power Systems	CaI	<i>Clostridium acetobutylicum</i> hydrogenase
BPS	Bi Phenyl Sulfone	CaO	Calcium oxide
BPS100	Fully disulfonated poly(arylene ether sulfone)	CARB	California Air Resources Board
BPSH	Block polysulfone ether polymer	CaS	Calcium sulfide
BPSH	Bi Phenyl Sulfone: H Form	CaSFCC	California Stationary Fuel Cell Collaborative
BPSH-30	Biphenyl sulfone H form, 30% molar fraction of disulfonic acid unit (30% level of sulfonation)	CB	Conduction band; Carbon black
BPSH-x	BiPhenyl based disulfonated polySulfone (H+ form) (x denotes degree of sulfonation)	CBECS	Commercial Building Energy Consumption Survey
BPVC	Boiler and Pressure Vessel Code	CbHS	Carbon-based hydrogen storage
BPVE	Perfluorocyclobutane-biphenyl vinyl ether	CBM	Conduction band minimum
BPVE-6F	Perfluorocyclobutane-biphenyl vinyl ether hexafluoroisopropylidene	CBN	Carbon-boron-nitrogen
BPY	2,2'-bipyridine	CBS	Casa Bonita strain; Complete basis set
		cc	Cubic centimeter(s)
		CCC	Carbon composite catalyst
		CCD	Charge-coupled device
		CCF	Complex coolant fluid

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cc/g cat/hr	Cubic centimeter(s) per gram catalyst per hour	CHMC1	Test Method for Evaluating Material Compatibility for Compressed Hydrogen Applications—Phase I-Metals
CcH ₂	Cryo-compressed hydrogen	CHP	Combined heat and power
CCHSS	Complex Compound Hydrogen Storage System	CHPFC	Combined heat and power fuel cell
CCL	Cathode catalyst layer	CHS	Chemical hydrogen storage
CCM	Catalyst-coated membrane	CHSCoE	Chemical Hydrogen Storage Center of Excellence
cc/min, ccm	Cubic centimeters per minute	CI	Compression ignition
ccp	Cubic close-packing	CIGSe ₂	Copper indium gallium diselenide
CCS	Carbon capture and storage	CIGS	Copper indium gallium diselenide
CC&S	Carbon capture and sequestration	Cl	Chlorine
CCVJ	9-([E]-2-carboxy-2-cyanovinyl)julolidine	CL	Catalyst layer; ϵ -caprolactone
Cd	Cadmium	cm	Centimeter
CD	Compact disk; Charge depleting; Cathode dewpoint	CM	Controls module
Cdl	Double layer capacitance	cm ²	Square centimeter
cDNA	Complementary DNA	CMO	Conductive metal oxides
CDO	Code development organization	CMWNT	Carbon multi-walled nanotube
CDP	Composite data product	CN	Carbon-nitrogen
CdS	Cadmium sulfide	CNC	Carbon nanocage
C-DSM™	Chemically etched dimensionally stable membrane	CNF	Carbon nano-fiber
Ce	Cerium	CNG	Compressed natural gas
CEA	Commissariat à l'Énergie Atomique	CNT	Carbon nanotube
CEC	California Energy Commission	Co	Cobalt
CEM	Compressor/expander motor (module)	CO	Carbon monoxide
CeO ₂	Ceric oxide	CO ₂	Carbon dioxide
CF	Carbon fiber; Carbon foam	CO _{2e}	Carbon dioxide equivalent
CFC	Chlorofluorocarbon	COD	Chemical oxygen demand
CFD	Computational fluid dynamics	COE	Cost of electricity
CFF	Complex coolant fluid	COF	Covalent-organic framework
cfm	Cubic feet per minute	COF ₂	Carbonyl fluoride
CGA	Compressed Gas Association	COGS	Cost of goods sold
CGH ₂	Compressed gaseous hydrogen	COMSOL	Multiphysics modeling and engineering simulation software
CGM	Charge-generating material	COPV	Composite overwrapped pressure vessel
CGO	Cerium gadolinium oxide, Gd-doped CeO ₂	COS	Carbon oxysulfide; Carbonyl sulfide
CGS	Copper gallium diselenide, CuGaSe ₂	COx	Oxides of carbon
CGSe ₂	Copper gallium diselenide	c _p	Specific heat
CH	Chemical hydride	cp	Commercial purity
cH ₂	Compressed hydrogen gas	cP	Centipoise
CH ₄	Methane	CpI	<i>Clostridium pasteurianum</i> [FeFe]-hydrogenase
CHEX	Continuous catalytic heat exchanger	CPMAS	Cross polarization magic angle spinning
CHHP	Combined heat, hydrogen, and power	CPO, CPOX	Catalytic partial oxidation
Chl	Chlorophyll	c.p.s.	Counts per second

CPU	Computer processing unit	dB(A)	Decibel(s) A scale
CPV	Composite pressure vessel	DBBPDSA	4, 4'-dibromobiphenyl 3, 3'-disulfonic acid, monomer
Cr	Chromium	DBPDSA	1, 4-dibromo phenylene 2, 5-disulfonic acid
CRADA	Cooperative Research and Development Agreement	DC	Direct current
CRCC	Corrosion-resistant conducting catalytic	DCTDD	1,8-diazacyclotetradecane-2,7-dione
CRTP	Corrosion-resistant transparent protective	DDMEFC	Direct dimethyl ether fuel cell
Cs	Cesium	DDP	Detailed Data Product
C&S	Codes and standards	d_{DR}	Dubini-Radushkevich average micropore diameter
CSA	Canadian Standards Association; Cell stack assembly	DDR	A zeolite structure code
CSMP	Cabot Superior MicroPowders	DEF	Diethylformamide
CSTT	Codes and Standards Tech Team	Deg	Degree
CSU	California State University	DEGDBE	Diethylene glycol dibutyl ether
CSULA	California State University Los Angeles	ΔB_a	The difference in magnetic induction at high and low applied magnetic fields
CT	Computed tomography	ΔG	Gibbs free energy of reaction
CTA	Charge transfer agent	ΔH	Enthalpy of reaction; Enthalpy of hydrogenation
CTAB	Cetyl trimethyl ammonium bromide	ΔH_f°	Standard heat of formation
CTB	Cyclotriborazane	ΔK	Stress intensity factor
CTE	Coefficient of thermal expansion	ΔP	Pressure drop; Pressure change
CTTRANSIT	Connecticut Transit	DEMS	Differential electrochemical mass spectroscopy
Cu	Copper	DFM	Design for manufacturing
CU	University of Colorado	DFMA [®]	Design for Manufacturing and Assembly
Cu ₂ O	Cuprous oxide	DFT	Density functional theory
CuBiW ₂ O ₈	Copper bismuth tungstate	DGDE	Di-ethylene glycol di-butyl ether
cu in.	Cubic inch	DHBC	2,5-dihydroxybenzene dicarboxylate
CuInGaS ₂	Copper indium gallium sulfide	DI	Deionized; De-ionized water
CuNW	Copper nanowire	DLC	Diamondlike carbon
CuO	Cupric oxide; Copper(II) oxide	dL/g	Deciliters per gram
CuWO ₄	Copper tungstate	DM	Diffusion media
cu.yd.	Cubic yard(s)	DMA	Dimethylacetamide
CV	Cyclic voltammetry; Cyclic voltammogram	DMAc	Dimethyl acetamide
CVD	Chemical vapor deposition	DMC	Diffusion Monte Carlo; Direct manufactured cost
CVS	Chemical vapor synthesis	DMDF	2,5-dimethoxy 2,5-dihydrofuran
CWRU	Case Western Reserve University	DMDS	Dimethyldisulfide
CY	Calendar year	DME	Dimethyl ether; Dimethoxyethane
CZO	Ceria-zirconia	DMEA	Dimethylethylamine
d	Day(s)	DMEAA	Dimethylethylamine alane
D ₂	Deuterium	DMF	n, n-di-methyl formamide
D-A	Dubinin-Astakhov	DMFC	Direct methanol fuel cell
DAC	Diamond anvil cell	dmimMeSO ₄	1,3-dimethyl-imidazolium methylsulfate
DADB	Diammoniate of diborane, [(NH ₃) ₂ BH ₂][BH ₄]		
DAKOTA	Design Analysis Kit for Optimization and Terascale Applications		
DB	Diborane (B ₂ H ₆)		

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dmpe	Dimethylphosphinoethane	ECV	Electrochemical capacitance voltage
DMPO	5,5-Dimethylpyrroline-N-oxide	ED	Ethylenediamine
DMSO	Dimethyl sulfoxide	EDA	Ethylene diamine; Energy decomposition analysis
DMT	Dimethyltrityl	EDAX	Manufacturer of energy dispersive X-ray hardware and software
DMTHF	Dimethyltetrahydrofuran	EDBB	Ethylenediamine bisborane
DNA	Deoxyribonucleic acid	EDC	Energy distribution curve
DNG	Desulfurized natural gas	edmimCl	2-ethyl-1,3-dimethyl-imidazolium ethylsulfate
DNI	Direct normal insolation	EDP	Electrophoretic deposition
DOD	Depth of discharge; Department of Defense	EDS	Energy dispersive X-ray spectroscopy; Energy dispersive spectrum
DOE	Department of Energy	EDTA	Ethylenediamine tetraacetic acid
DOT	Department of Transportation	EDX	Energy dispersive X-ray
DP	Dew point	EELS	Electron energy loss spectroscopy
DRIFTS	Diffuse reflectance infrared Fourier transform spectroscopy	EERE	U.S. DOE Office of Energy Efficiency and Renewable Energy
DSC	Differential scanning calorimetry; Dynamic scanning calorimetry	EFR-AHJ	Emergency first responder-authorities having jurisdiction
DSM TM	Dimensionally stable membrane	EFTE	Ethylene-tetrafluoroethylene
DSM-MC	Distance scaling method Monte Carlo	e.g.	<i>Exempli gratia</i> : for example
DVBPC	Divinyl aryl ether monomer	EGR	Exhaust gas recirculation
DVD	Digital video disk	EHC	Electrochemical hydrogen compressor
DVMT	Daily vehicle miles traveled	EHS	Environmental Health and Safety
e ⁻	Electron	EIA	Energy Information Administration of the U.S. Department of Energy
E	Activation energy, kJ/mol	EIGA IGC	European Industrial Gases Association/ Industrial Gases Council
E ₀ xE ₁	Utilization efficiency of incident solar light energy	EIHP	European Integrated Hydrogen Project
E _{1/2}	Half-wave potential	EIS	Electrochemical impedance spectroscopy
E85	85%-15% blend of ethanol with gasoline	EISF	Elastic incoherent structure factor
E _a	Activation energy	ELAT [®]	Registered Trademark of De Nora North America, Inc., covers GDLs and GDEs
EA	Environmental assessment	EMA	Effective medium approximation
E _{ad}	Hydrogen adsorption heat	EMF	Electromagnetic field
EAN	Ethylammonium nitrate	EMI	Electro magnetic interference
EASA	Electrochemically active surface area	EMPA	Electron microprobe analysis
E-BOP	Electrical balance of plant	ENABLE	Energetic neutral atom beam lithography/ epitaxy
EBSD	Electron backscatter diffraction	ENG	Expanded natural graphite
EC	European Commission; Electro-chemical; Evaporative-cooled; Efficiency of conversion; Electrochemical capacitance	eNMR	Electrochemical nuclear magnetic resonance
ECA	Electrochemical area	EODC	Electro-osmotic drag coefficient
ECB	Ethylcyclobutane	EOL	End of life
ECC	Electrochemical compressor; Engineered cementitious composite	EOT	End of test
ECE	Economic Commission for Europe	EPA	Environmental Protection Agency
ECS	Equilibrium crystal shape	EPD	Electrophoretic deposition
ECSA	Electrochemically active surface area; Electrochemical surface area; Effective catalyst surface area		

EPDM	Ethylene propylene diene monomer	FCTES ^{QA}	Fuel Cell Testing, Safety and Quality Assurance (an international effort to harmonize fuel cell testing procedures)
EPHC	Ethylperhydrocarbazole		
ePTFE	Expanded polytetrafluoroethylene	FCCTO	Fuel Cell Technologies Office
ER	Emergency responder	FCCT	Fuel Cell Technical Team
ERW	Electric resistance weld	FCV	Fuel cell vehicle
ES	Energy storage	Fd	Ferredoxin
ESA	Electrochemical surface area	Fe	Iron
ESEM	Environmental scanning electron microscope	FE	U.S. DOE Office of Fossil Energy
ESIF	Energy Systems Integration Facility	Fe ₂ O ₃	Ferric oxide
et al.	<i>Et Alii</i> : and others	FEA	Finite element analysis
ETA	Event tree analysis	FEM	Finite element model
etc.	<i>Et cetera</i> : and so on	FEP	Fluorinated ethylene propylene; Teflon [®]
E-TEK	Division of De Nora North America, Inc.	FESEM	Field emission scanning electron microscope
ETFE	Ethylene-tetrafluoroethylene	fg-ELAT	Fine gradient ELAT
ETFECS	Extended thin film electrocatalyst structures	FIB	Focused ion beam
EtOH	Ethanol	FISIPE	Fibras Acrilicas Portugese
EU	European Union	FLiNaK	LiF-NaF-KF eutectic salt
eV	Electron volt	FLP	Frustrated Lewis pair
EVD	Extreme value distributions	Fluent	Computer code for computational fluid dynamics
EVOH	Ethylene vinyl alcohol	FMEA	Failure modes and effects analysis
EVSE	Electric vehicle supply equipment	¹⁹ FNMR	¹⁹ Fluorine nuclear magnetic resonance
EW	Equivalent weight	FNR	Ferredoxin NADP+ oxidoreductase
EXAFS	Extended X-ray absorption fine structure analysis	FOM	Federated object model
F	Fluorine	FOM	Figure of merit
F	Faraday constant, the amount of electric charge in one mole of electrons (96,485.3383 coulomb/mole)	FPA	Fluoroalkyl phosphonic and phosphinic acids
F ⁻	Fluorine ion	fpi	Fins per inch
FA	Furfyl alcohol	fpm	Feet per minute
FANS	Filter analyzer neutron spectroscopy	FPS	Bis(4-fluorophenyl)sulfone; Fuel processing system
FAT	Fleet Analysis Toolkit; Factory acceptance test	FRP	Fiber-reinforced composite piping; Fiber-reinforced polymer; Full rate production
FBMR	Fluidized bed membrane reactor	FRR	Fluoride release rate
FC	Fuel cell	F-SPEEK	Fluorosulfonic acid of polyetheretherketone
FCB	Fuel cell bus	FSW	Friction stir welding
FCC	Face-centered cubic; Fuel Cell Catalyst; Fluid catalytic cracking	ft	Feet
FCEB	Fuel cell electric bus	FT	Fault tree
FCEV	Fuel cell electric vehicle	ft ²	Square feet
FCI	Fixed capital investment	ft ³	Cubic feet
FC POWER	Fuel Cell Power Model	FTA	Federal Transit Administration
FCPP	Fuel cell power plant	FT-IR, FTIR	Fourier transform infrared
FCS	Fuel cell system	FTIR-ATR	Fourier transform infrared attenuated total reflection
FCSMR	Forecourt steam methane reformer (ing)	FTO	Fluorine-doped tin oxide
FCT	Fuel Cell Technologies	FTP, FTP-75	Federal Test Procedure

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FWS	Fixed-window scan	GLY	Glycerol
FW	Formula weight; Filament winding	Glyme	Dimethoxyethane
FWHM	Full width at half maximum	gm	Gram(s)
FY	Fiscal year	GM	General Motors
g	Gram; acceleration of gravity	gm/day	Gram(s) per day
G	Graphite	g/min	Gram(s) per minute
Ga	Gallium	GNF	Graphite nanofiber
GaAs	Gallium arsenic	GO	Graphene oxide
GADDS	General area diffraction system	GODC	Graphene oxide derived carbon
gal	Gallon	GOF	Graphene-oxide framework
GaP	Gallium phosphide	GPa	Gigapascal(s)
GB	Gigabyte	GPAT	Global Pathways Resource Analysis Tool
GC	Gas chromatograph; General computational	GPC	Gel permeation chromatography
GC	Glassy, or vitreous carbon: a pure carbon that is amorphous (non-crystalline)	GPS	Global positioning system
g/cc	Grams per cubic centimeter	GPU	Gas permeation units
GCLP	Grand-canonical linear programming	GRC	Glass-reinforced concrete
GCMC	Grand Canonical Monte Carlo	GREC	Graphite reinforced epoxy composite (IM6 continuously wound)
GCMS	Gas chromatograph-mass spectroscopy	GREET2	Greenhouse gases, Regulated Emissions and Energy use in Transportation model
GCNF	Graphitized carbon nano-fiber	GRPE	Working Party on Pollution and Energy
GCNT	Graphitized carbon nanotubes	g/s	Grams per second
GCTool	Software package developed at ANL for analysis of fuel cells and other power systems	GTI	Gas Technology Institute
Gd	Gadolinium	GTR	Global Technical Regulations
GDC	Gadolinium-doped ceria	GUI	Graphical user interface
GDE	Gas diffusion electrode	GV	Gasoline vehicle
GDL	Gas diffusion layer	GVW	Gross vehicle weight
GDM	Gas diffusion media	GW	An approximation permitting practical calculation of excitation energies in metals, semi-conductors and insulators
GDS	Galvanodynamic scan	GWe, GW _e	Gigawatt(s) electric
Ge	Germanium	h	Hour(s)
GES	Giner Electrochemical Systems, LLC	H	Hydrogen
GF	Glass fiber	H+	Proton
GFC	Gas flow channel	H ⁻	Hydride
GFP	Green fluorescent protein	H ₂	Diatomic hydrogen
GGA	Generalized gradient approximation	H2A	Hydrogen Analysis project sponsored by DOE
GGE, gge	Gasoline gallon equivalent	H ₂ BPyDC	2,2'-bipyridine-5,5'-dicarboxylic acid
GH ₂	Gaseous hydrogen	H ₂ cat	Catechol, 1,2 dihydroxybenzene
GHG	Greenhouse gas	H ₂ -FCS	Stationary fuel cell system designs that co-produce hydrogen
GHSV	Gas hourly space velocity	H ₂ (hfipbb)	4,4'-(hexafluoroisopropylidene)bis(benzoic acid)
GIS	Geographic information system	H2I	Hawaii Hydrogen Initiative
GJ	Gigajoule(s)	H2-ICE, H ₂ ICE	Hydrogen internal combustion engine
g/kW	Gram(s) per kilowatt		
GLACD	Glancing angle co-deposition		
GLAD	Glancing angle deposition		
GLS	Gas-liquid separator		

H ₂ Lib	Library of H ₂ component models in Simulink [®]	HER	Hydrogen evolution reaction
H ₂ O	Water	HES	Hydrogen energy station
H ₂ O ₂	Hydrogen peroxide	HEV	Hybrid electric vehicle
H ₂ oba	4,4'-oxybis-benzoic acid	HEX	Heat exchanger
H2QWG	DOE Hydrogen Quality Working Group	Hf	Hafnium
H ₂ S	Hydrogen sulfide	HF	Hydrogen Fueler
H ₂ SO ₄	Sulfuric acid	HF	Hydrofluorhydric acid; Hydrogen fluoride; Hartree-Fock
H2V	Hydrogen vehicle	HFB	Hexafluorobenzene
H ₃ BBC	1,3,5-tris(4'-carboxy[1,1'-biphenyl]-4-yl-)benzene	HFC	Hydrogen fuel cell
H ₃ BTB	4,4',4''-benzene-1,3,5-triyl-tribenzoic acid	HFCTF	Hawaii Fuel Cell Test Facility
H ₃ PO ₄	Phosphoric acid	HFCV	Hydrogen fuel cell vehicle
HAADF	High-angle annular dark-field	HFI	Hydrogen Fuel Initiative
HAADF-STEM	High angle annular dark field scanning transmission electron microscopy	HFP	Hexafluoropropylene
HAMMER	Hazardous Materials Management and Emergency Response	HFP	1,1,1,3,3,3 hexafluoro-2-propanol
HATCI	Hyundai America Technical Center, Inc.	HFR	High-frequency resistance
HAVO	Hawaii Volcanoes National Park	HFS	Hydrogen fueling station
HAZ	Heat-affected zone	HFSS	High-flux solar simulator
HAZID	Hazard Identification Analysis	HFV	Hydrogen-fueled vehicle
HAZOP	Hazards and Operational Safety Analysis; Hazards and operability analysis	HGEF	Hawaii Gateway Energy Center
HB	Hydrazine borane	HGM	Hydrogen Generation Module
HBr	Hydrogen bromide	HGMs	Hollow glass microspheres
HBTU	o-Benzotriazol-1-yl-N,N,N',N'-tetramethyluronium hexafluorophosphate	HGV	Hydrogen gaseous vehicle
HCC	Hybrid cathode catalyst	HHV	Higher heating value
HCl, HCL	Hydrochloric acid; Hydrogen chloride	HI	Hydrogen iodide, hydriodic acid
HClO ₄	Perchloric acid	HIA	Hydrogen-induced amorphization; Hydrogen Implementing Agreement
HCN	Hydrogen coordination number	HIAD	Hydrogen Incidents and Accidents Database
HCNG	Hydrogen-compressed natural gas	HIB	High-impedance buffer
HCO ₃ ⁻	Bicarbonate	HIC	Hydrogen-induced cracking
hcp	Hexagonal close-packing	HICE	Hydrogen internal combustion engine
HC&S	Hawaiian Commercial and Sugar Company	HiPCO, HiPCo	High-pressure carbon monoxide
HD	Deuterium hydride	HIPOC	Hydrogen Industry Panel on Codes
HDF	Hydrogen dispensing facility	HIx	Blend of hydrogen iodide, iodine, and water
HDPE	High-density polyethylene	HIZ	Perhydro-indolizidine
HDS	Hydrogen desulfurization	HKUST	1 Cu ₃ (1,3,5-benzenetricarboxylate) ₂
HDSAM	Hydrogen Delivery Scenario Analysis Model	HLA	High level architecture
He	Helium	HMC	Hyundai Motor Company
HE	Hydrogen embrittlement	HNEI	Hawaii Natural Energy Institute
HEMA	2-hydroxyethyl methacrylate	HNO ₃	Nitric acid
HEN	Heat exchange network	HOMO	Highest occupied molecular orbital
HEPA	High efficiency particulate air filter	HOPG	Highly-ordered pyrolytic graphite
		HOR	Hydrogen oxidation reaction
		hp	Horsepower
		HP	High pressure

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HPA	Heteropoly acid	HTM	High-temperature membrane; Hydrogen transport membrane
HPA-C	Heteropoly acid	HTMWG	High Temperature Membrane Working Group
HPC	Highly porous carbon	HTPEM	High-temperature polymer electrolyte membrane
HPEP	Hydrogen Production Expert Panel	HTWGS	High-temperature water-gas shift
HPIT	Hydrogen-powered industrial truck	HTXRD	High-temperature X-ray diffraction
HPLC	High performance liquid chromatography	HVAC	Heating, ventilation, and cooling
HPPH	1,6-di(4-hydroxyl)phenylperfluorohexane	HWCVD	Hot-wire chemical vapor deposition
HPPS	<i>N,N</i> -diisopropylethylammonium 2,2-bis(<i>p</i> -hydroxyphenyl) pentafluoropropanesulfonate	HWD	Hot wire deposition
HPRD	Hydrogen pressure relief device	HWFET	Highway Fuel Economy Test
HQS100	Hydroquinone sulfone	HX	Heat exchanger
hr	Hour(s)	HyARC	Hydrogen Analysis Resource Center
HRA	Home refueling appliance	HYDA	<i>Chlamydomonas reinhardtii</i> [FeFe] hydrogenase
HRS	Hydrogen refueling stations	Hydrofill™	GTI hydrogen dispenser filling control algorithm
HRT	Hydraulic retention time	HyDRA	Hydrogen Demand and Resource Analysis
HRTEM	High-resolution transmission electron microscopy	HyPro, HYPRO	Analysis tool
HR-STEM	High resolution scanning transmission electron microscopy	HyQRA	Hydrogen quantitative risk assessment
HRXRT	High-resolution X-ray tomography	HyS	Hybrid sulfur
HS	Hydrogen sorption	HYSYS®	Process simulation software by AspenTech, computer code for flowsheet analysis
HSAC	High surface area carbon	HyTE _x	Hydrogen Technical Experimental (database)
HSC	Database name derived from the letters for enthalpy, entropy, and heat capacity	HyTRANS	DOE's market simulation model for the transition to hydrogen vehicles
HSCC	Hydrogen Station Cost Calculator	Hz	Hertz
HSCoE	Hydrogen Sorption Center of Excellence	HZM	Hot zone module
HSDC	Hydrogen Secure Data Center	i	Current density (mA/cm ²)
HSE	High surface area electrode	I	Current
HSECoE	Hydrogen Storage Engineering Center of Excellence	I ₂	Diatomic iodine
HSMCoE	Hydrogen Storage Material Center of Excellence	I2CNER	International Institute for Carbon-Neutral Energy Research
HSO ₄	Bisulfate anion	IBAD	Ion beam assisted deposition
HSP	Hydrogen safety plan	IBS	Ion beam sputtering
HSRP	Hydrogen Safety Review Panel	I/C	Ionomer to catalyst
HSSIM	Hydrogen Storage SIMulator	IC	Internal combustion
HSU	Hydrogen separation unit	ICC	International Code Council
HT	High temperature	ICE	Internal combustion engine
H-T-NT	Hierarchical TiO ₂ nanotubes	ICEV	Internal combustion engine vehicle
HTAC	Hydrogen and Fuel Cell Technical Advisory Committee	ICMS	Integrated ceramic membrane system
HTFC	High-temperature fuel cell	ICP	Inductively coupled plasma
HTFSA	Trifluomethylsulfonic acid	ICPAE	Inductively coupled plasma atomic emission
HTGR	High-temperature gas-cooled reactor	ICP-AES	Inductively coupled plasma atomic emission spectroscopy
HTHX	High-temperature heat exchanger		

ICP-MS	Inductively coupled plasma mass spectrometry	IPCE	Incident photon conversion to electrons; Incident photon conversion efficiency
ICP-OES	Inductively coupled plasma optical emission spectroscopy	IPE	Integrated photovoltaic electrolysis
ICR	Interfacial contact resistance	IPES	Inverse photoemission spectroscopy
ID	Inside diameter	IPHE	International Partnership for the Hydrogen Economy
i.e.	<i>id est</i> : that is	IPNS	Intense Pulse Neutron Scattering Facility at Argonne National Laboratory
IE	Intelligent Energy	IQE	Internal quantum efficiency
IEA	International Energy Agency	IR	Infrared
IEA-HIA	International Energy Agency Hydrogen Implementing Agreement	iR	Internal resistance
IEC	International Electrotechnical Commission	Ir	Iridium
IEC	Ion exchange capacity, milliequivalents of acid groups per gram of material	IRMOF	Isoreticular metal organic framework
IECV	Integrated end cap vessel	IrO _x	Iridium oxide
IEEE	Institute of Electrical and Electronics Engineers, Inc.	IRR	Internal rate of return
IET	Institute for Energy and Transport	IRRAS	Infrared reflection-absorption spectroscopy
IFC	International Fire Code	ISIS	World's leading pulsed neutron and muon source located at the UK Rutherford Appleton Laboratory near Oxford
IGBT	Insulated-gate bipolar transistor	ISO	International Organization for Standardization
IGCC	Integrated gasification combined cycle	ISO TC197	International Standards Organization Technical Committee
IGCC-CMR	Integrated gasification combined cycle-catalytic membrane reactor	ISS	Ion scattering spectroscopy
IGCC-MR	Integrated gasification combined cycle-membrane reactor	ITM	Ion transport membrane
IGCC-PBR	Integrated gasification combined cycle-palladium-based reactor	ITO	Indium tin oxide
IGT	Institute of Gas Technology	ITP	Indium tin phosphate
IIC	Industrial, institutional, and commercial	ITWS	Isothermal water splitting
IINS	Inelastic incoherent neutron scattering	IV	Current-voltage
IIT	Illinois Institute of Technology	J	Current; Joule(s)
IL	Ionic liquid	JHQTF	Joint Hydrogen Quality Task Force (U.S. Fuel Cell Council)
ILS	Inter-laboratory studies	JM	Johnson Matthey
ILTA	Ionic liquids tethered to amineboranes	JMFC	Johnson-Matthey Fuel Cells, Inc.
In	Indium	JNAIST	Japanese National Institute of Advanced Industrial Science and Technology
In., in	Inch	JOBS FC	JOBS and economic impacts of Fuel Cells
in ²	Square inch	JOBS H2	JOBS and economic impacts of Hydrogen
INER	Institute of Nuclear Energy Research	JPL	Jet Propulsion Laboratory
INERI	International Nuclear Energy Research Initiative	JRC	Joint Research Centre
InP	Indium phosphorus	J-V, JV	Current density-voltage
INS	Inelastic neutron scattering	K	Sievert's constant, ml/[cm ² -min-atm ^{1/2}]
I-O	Input-output	K	Kelvin, absolute temperature
IOS	Intelligent Optical Systems, Inc.	K	Potassium
IP	Induction period; Intellectual property	kÅ	1,000 angstroms
IPA	Isophthalate; Isopropyl alcohol	KAERI	Korea Atomic Energy Research Institute
IPCC	Intergovernmental Panel on Climate Change		

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KAIST	Korea Advanced Institute of Science and Technology	LANL	Los Alamos National Laboratory
kA/m ²	Kilo-ampere(s) per square meter	LAO	Lanthanum-modified alumina
kb	Kilo-base pair, a unit of measurement used in genetics equal to 1,000 nucleotides	LAPS	Large aperture projection scatterometer
KBr	Potassium bromide	LAS	Large aperture scatterometry
kcal	Kilocalorie(s)	lb	Pound(s)
kcal/mol	Kilocalorie(s) per mole	LBM	Lattice Boltzmann method
KeV	Kilo electron volt(s)	lbmol	Pound(s)-mole
kg	Kilogram(s)	LBNL	Lawrence Berkeley National Laboratory
kg/d	Kilogram(s) per day	LC	Liquid carrier; Low concentration
kg/hr	Kilogram(s) per hour	LCA	Life cycle assessment; Life-cycle analysis
kg/m ³	Kilogram(s) per cubic meter	LCC	Life cycle cost
KH	Potassium hydride	LCC	La _{0.7} Ca _{0.3} CrO _{3-δ}
KHTC	Hydrotalcites; Potassium-promoted hydrotalcite	LCH ₂	Hydrogenated liquid carrier; Compressed hydrogen produced from liquid hydrogen
kHz	Kilohertz	LCHPP	Low Cost Hydrogen Production Platform (DOE Program Title)
K _{IH}	Fracture toughness measured in hydrogen gas	LCMS	Liquid chromatography-mass spectroscopy
kJ	Kilojoule(s)	LCOD	Levelized cost of driving
K _{JIC}	Fracture toughness	LCOE	Levelized cost of electricity
kJ/mol	Kilojoule(s) per mole	L/D	Length to diameter ratio
km	Kilometer(s)	LDV	Light-duty vehicle
KMC	Kinetic Monte Carlo	LED	Light emitting diode
KOH	Potassium hydroxide	LEED	Low-energy electron diffraction
kPa	Kilopascal(s)	LEL	Lower explosion limit
kph	Kilometer(s) per hour	LFG	Landfill gas
ksi	1,000 pound-force per square inch	LFL	Lower flammability limit
kT/y	Kiloton(s) per year	L/h, l/h	Liter(s) per hour
K _{th} , K _{th}	Fracture toughness threshold	LH ₂ , LH ₂	Liquid hydrogen
K _{TH}	Hydrogen-assisted crack growth threshold	LHC	Light-harvesting chlorophyll
kVA	Kilovolt-amp(s) (units of apparent power)	LHSV	Liquid hourly space velocity, h ⁻¹
kW	Kilowatt(s)	LHV	Lower heating value
kWe, kW _e	Kilowatt(s) electric	Li	Lithium
kWh	Kilowatt-hour(s)	Li ₃ N	Lithium nitride
kWh/kg	Kilowatt-hour(s) per kilogram	Li-AB	Lithium amidoborane, Li-NH ₂ -BH ₃
kWh/L	Kilowatt-hour(s) per liter	LiBH ₄	Lithium borohydride
kW/kg	Kilowatt(s) per kilogram	LIBS	Laser-induced breakdown spectroscopy
kWt	Kilowatt(s) thermal	LiH	Lithium hydride
L, l	Liter(s)	LLC	Limited Liability Company; Lessons Learned Corner
La	Lanthanum	LLNL	Lawrence Livermore National Laboratory
LAGP	Lithium aluminum germanium phosphate	L/min, l/min	Liter(s) per minute
LAH	Lithium aluminum hydride (LiAlH ₄)	LMWO	Lanthanum molybdenum tungsten oxide (e.g., La ₂ Mo _{1.8} W _{0.2} O _{9-x})
λ	Lambda, hydration number	LN ₂	Liquid nitrogen
LAMH	Lithium amide and magnesium hydride	LNG	Liquefied natural gas
LAMOX	Lanthanum molybdenum oxide (e.g., La ₂ Mo ₂ O ₉)	LOC	Liquid organic carrier

LOHC	Liquid organic hydrogen carrier	M70	Arkema's fourth-generation membrane candidate
LP	Lattice parameter	MA	Mass activity; methyl acrylate
LPG	Liquefied petroleum gas	MA3T	Market Acceptance of Advanced Automotive Technologies
LPM	Liter(s) per minute	μA	Microampere(s)
LPR	Liquid-phase reforming	mA	Milliamp(s)
LQ*	Dehydrogenated liquid carrier	MA	Mass activity
LQ*H2	Hydrogenated liquid carrier	M-AB	Metal ammonia-borane
LRIP	Low rate initial production	MAB, M-AB	Metal amidoboranes
LRS	Laser raman spectroscopy	$\mu\text{A}/\text{cm}^2$	Microampere(s) per square centimeter
LSAC	Low surface area carbon	mA/cm^2	Milliamp(s) per square centimeter
LSC	Lanthanum strontium cobalt oxide, (La, Sr) CoO_3 , strontium-doped lanthanum cobaltite, $\text{La}_{0.8}\text{Sr}_{0.2}\text{CoO}_{3+\delta}$	MARKAL	Market Allocation Model—A generic, multi-sector energy model developed by the Energy Technology Systems Analysis Program of the International Energy Agency
LSCF	Lanthanum strontium cobalt iron oxide, (La, Sr)(Co, Fe) O_3	MAS	Magic angle spinning
LSCF7328	La-Sr-Cu-Fe-O	MAS ^{11}B -NMR	Magic angle spinning boron-11 nuclear magnetic resonance spectroscopy
LSCM	Lanthanum strontium chromium manganese oxide, (La, Sr)(Cr, Mn) O_3	MAS-NMR	Magic angle spinning nuclear magnetic resonance
LSCr	Lanthanum strontium chromium oxide, (La, Sr) CrO_3	MATI	Modular Adsorption Tank Insert
LSM	Lanthanum strontium manganese	MAWP	Maximum allowable working pressure
LSMO	Lanthanum strontium manganese oxide, (La, Sr) MnO_3 , strontium-doped lanthanum manganite, $\text{La}_{0.8}\text{Sr}_{0.2}\text{MnO}_{3+\delta}$	MB	Megabyte
LST	Lanthanum strontium titanium oxide, (La, Sr) TiO_3	MBE	Molecular beam epitaxy
LSV	Lanthanum strontium vanadate; Linear sweep voltammetry	MBMS	Molecular beam mass spectrometry
LT	Low-temperature	M-BOP	Mechanical balance of plant
LTDMs	Laser induced thermal desorption mass spectrometry	MBRC	Miles between roadcall
LUMO	Lowest unoccupied molecular orbital	MBWR	Modified Benedict Webb Rubin
m	Meter(s)	MC	Monte Carlo; Methyl cellulose
M	Mole, Molar; Million	mC^2	Multi-component composite (membrane)
m^2	Square meter(s)	MCB	Marine Corps Base
m^2/g	Square meter(s) per gram	$\text{mC}\text{-cm}^{-2}$	Millicoulomb(s) per square centimeter
m^2/s	Square meter(s) per second	MCEL	Millenium Cell, Inc.
m^3	Cubic meter(s)	MCFC	Molten carbonate fuel cell
M31	Arkema's first-generation membrane candidate	mCHP	Micro-combined heat and power
M41	Arkema's second-generation membrane candidate	μCHP	Micro-combined heat and power
M43	Arkema's third-generation membrane candidate	μCHX	Microscale combustor/heat exchanger
M51, M52, M53	Arkema's membranes incorporating phosphonic acid	MCM	Mobile crystalline material
		$\mu\text{c-Si}$	Microcrystalline silicon
		MDES	Methyl-diethoxy silane
		mdip	5,5'-methylene-di-isophthalate
		MEA	Membrane electrode assembly
		MeAB	Methylamine borane
		MEAM	Modified embedded atom method

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MEC	Microbial electrolysis cell; Minimum explosive concentration	MMBtu	Million British thermal units
MeCN	Acetonitrile	MM-FSW	Multi-pass, multi-layer friction stir welding
MEIC	Mixed electronic and ionic conducting (membranes)	MMOF	Microporous metal-organic framework
MEMS	Micro-electro-mechanical systems	mmol	Millimole(s)
MeOH	Methanol	μmol	Micromole(s)
meq	Milliequivalents	MMSCFD	Million standard cubic feet/day
meq/g	Milliequivalents/gram	MMT	Million metric tonnes
MES	Microstructured electrode scaffold	Mn	Manganese
MeV	Mega electron volt	Mn_2O_3	Manganese oxide
mf	Mass fraction	M-N-H	Amide/imide
Mg	Megagram(s)	MnO	Manganese oxide
μg	Microgram(s)	$\mu\Omega\text{-cm}^2$	Micro-ohm(s)-square centimeter
mg	Milligram(s)	Mo	Molybdenum
MgCl_2	Magnesium chloride	MO	Molecular orbital; metal oxide
mg/cm^2	Milligram(s) per square centimeter	MOA	Memorandum of Agreement
MgH_2	Magnesium hydride	MOF	Metal-organic framework
$\text{MgH}_2@\text{C}$	MgH_2 incorporated in carbon scaffold	mol	Mole(s)
MgO	Magnesium oxide	MOL	Middle of life
Mg(OH)_2	Magnesium hydroxide	mol%	Mole percent
mgPt/cm^2	Milligram(s) of platinum per square centimeter	mol/min	Mole(s) per minute
MH, M-H	Metal hydride	$\text{m}\Omega$	Milli-ohm(s)
MHC	Metal hydride-based compressor	$\text{M}\Omega$	Mega-ohm(s)
MHCoE	Metal Hydride Center of Excellence	$\text{m}\Omega/\text{cm}^2$	Milli-ohm(s) per square centimeter
MHE	Material handling equipment	MoPc	Molybdenum phthalocyanine
MHI	Methylperhydroindole	MOR	Methanol oxidation reaction
MHz	Megahertz	MPa	Megapascal(s)
mi	Mile(s)	MPG, mpg	Mile(s) per gallon
MIE	Minimum ignition energy	MPGGE	Miles per gasoline gallon equivalent
MIEC	Mixed ionic and electronic conduction	mph	Mile(s) per hour
mi/kg	Mile(s) per kilogram	MPHI	Methylperhydroindole
mil	Millimeter(s)	MPL	Microporous layer
min	Minute(s)	MPMC	Massively Parallel Monte Carlo
MIT	Massachusetts Institute of Technology	mpy	Miles per year
MiTi [®]	Mohawk Innovative Technologies Inc.	MQMAS	Multiple quantum magic angle spinning
MJ	Megajoule(s)	MR	Membrane reactor
mL, ml	Milliliter(s)	MRCAT	Materials Research Collaborative Access Team
ML	Monolayer	MREC	Microbial reverse-electrodialysis electrolysis cell
μCHP	Micro-combined heat and power	MRI	Magnetic resonance imaging
μm	Micrometer(s); micron(s)	MRL	Manufacturing readiness level
μM	Micromolar	ms	Millisecond(s)
mM	Millimolar	MS	Mass spectroscopy; Mass spectrometry; More Stations
mm	Millimeter(s)	MSAC	Mid-range carbon support; Medium surface area carbon

mS/cm	Milli-Siemen(s) per centimeter	NaBH ₄	Sodium borohydride
MS-H ₂	Hydrogen mass spectrometry	NaBO ₂	Sodium metaborate
MSM	Macro-System Model	NACE	National Association of Corrosion Engineers
MSR	Membrane steam reformer	NaCl	Sodium chloride
MSRI	Materials and Systems Research, Inc.	NACS	North American Catalysis Society
MSTF	Mesostructured thin films	NADH	(reduced) Nicotinamide adenine dinucleotide
MTA	Metric tonne per annum; Mass Transportation Agency	NADP	Nicotinamide adenine dinucleotide phosphate
MTBF	Mean time between failure	NADPH	Nicotinamide adenine dinucleotide phosphate
MTBR	Mean time between repairs	Nafion [®]	Registered Trademark of E.I. DuPont de Nemours
M/TC	Metal-doped templated carbon	NaH	Sodium hydride
M-TCPP	M = Fe, Mn, Co, Ni, Cu, Zn, H ₂ , tetrakis(4-carboxyphenyl)porphyrin	NA NG	North American natural gas
mtorr	Millitorr	NaOH	Sodium hydroxide
μV	Microvolt(s)	NAS	National Academy of Sciences
mV	Millivolt(s)	NASA	National Aeronautics and Space Administration
MV	Methyl viologen	Nb	Niobium
mW	Milliwatt(s)	Ncc	Normal cubic centimeters
MW	Megawatt(s)	N/cm ²	Newton(s) per square centimeter
MW	Molecular weight	NCNR	NIST Center for Neutron Research
mW/cm ²	Milliwatt(s) per square centimeter	ND	Not determined at this time
MWCNT	Multiple-wall carbon nanotube	NDC	New delivery concept, Naphthalene-2,6-dicarboxylate
MWe	Megawatt(s) electric	nDDB	N-dodecyl benzene
MWh	Megawatt-hour(s)	NDE	Non-destructive examination
MWNT	Multi-wall carbon nanotube	NE	U.S. DOE Office of Nuclear Energy, Science, and Technology
MWOE	Midwest Optoelectronics, LLC	NEB	Nudged elastic band
MWth	Megawatt(s) thermal	NEC	National Electrical Code
MYPP	Multi-Year Program Plan (the Fuel Cell Technologies Office's Multi-Year Research, Development, and Demonstration Plan)	NEF	N-ethylformamide
MYRDD, MYRD&DP	Multi-Year Research, Development and Demonstration Plan	NEMS	National Energy Modeling System
N	Normal (e.g., 1N H ₃ PO ₄ is 1 normal solution of phosphoric acid)	NEPA	National Environmental Policy Act
N	Nitrogen atom	NETL	National Energy Technology Laboratory
N	Newton (unit of force)	NEU	Northeastern University
N112	Nafion [®] 1100 equivalent weight, 2 millimeter thick membrane	NEXAFS	Near edge X-ray absorption fine structure
N ₂	Diatomic nitrogen	NFCBP	National Fuel Cell Bus Program
N ₂ O	Nitrous oxide	NFCRC	National Fuel Cell Research Center
Na	Sodium	NFM	Nanoporous framework material
NA	North American	Nfn-Pt/C	Nafion [®] -loaded Pt/C
Na ₂ S	Sodium sulfide	NFPA	National Fire Protection Association
Na ₃ AlH ₆	Trisodium hexahydroaluminate	ng	Nanogram
NaAlH ₄	Sodium aluminum hydride; Sodium tetrahydroaluminate; Sodium alanate	NG	Natural gas
		NGCC	Natural gas combined cycle
		NGNP	Next Generation Nuclear Plant
		NGV	Natural gas vehicle

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NH ₃	Ammonia	NPPD	n-phenyl-phenylenediamine
NHA	National Hydrogen Association	NPS	National Park Service
NHE	Normal hydrogen electrode	NPT	Normal pressure and temperature
NHFC4	National Hydrogen and Fuel Cells Codes and Standards Coordinating Committee	NPV	Net present value
NHI	Nuclear Hydrogen Initiative	NR	Nanorod
NHTSA	National Highway Traffic Safety Administration of the U.S. Department of Transportation	NR ₃	Tertiary amine
Ni	Nickel	NRC	National Research Council
NICC	Natural gas Infrastructure Component Cost model	NREL	National Renewable Energy Laboratory
NILS	Normal interstitial lattice sites	NRELFAT	NREL Fleet Analysis Toolkit
NiMH	Nickel metal hydride	NRVS	Nuclear resonance vibrational spectroscopy
NIR	Near infra-red	NSF	National Science Foundation
NIST	National Institute of Standards and Technology	NSTF	Nano-structured thin-film
NL	Normal liter(s)	NSTFC	Nano-structured thin film catalyst
NLDFT	Non-local density functional theory	NT	Nanotube
nm	Nanometer(s)	NTCNA	Nissan Technical Center, North America
NM	Noble metal	NTE	Negative thermal-expansion
Nm ³	Normal cubic meter(s)	N-T-NT	Nano-grass type titania nanotube
NMHC	Non-methane hydrocarbons	NV	Neutron vibrational
NMOC	Non-methane organic carbons	NVS	Neutron vibrational spectroscopy
nmol	Nanomole(s)	NW	Nanowire
NMP	N-methylpyrrolidone	NWM	Natural Water Management, UTC Power's system and cell stack design which utilizes evaporative cooling in the cell stack assembly
NMR	Nuclear magnetic resonance	NYSERDA	New York State Energy Research and Development Authority
NMSU	New Mexico State University	NZVI	Nano zerovalent iron
NMT	New Mexico Tech	Ω	Ohm(s)
NNA	Non-North American	Ωcm ²	Ohm(s)-square centimeter
NNA NG	Non-North American natural gas	O	Oxygen
NNIF	NIST neutron imaging facility	O ₂	Diatomic oxygen
NNSA	National Nuclear Security Administration	O/C	Oxygen-to-carbon ratio
NO ₂	Nitric oxide	OCP	Open circuit potential
NOA	Norland Optical Adhesive	OCSD	Orange County Sanitation District
nOB	N-octyl benzene	OCV	Open-circuit voltage
NO _x , NO _x	Oxides of nitrogen	o.d., OD	Outer diameter
NP	Nanoparticle	ODA	Oxygenated form of diamine
NPB	Neopentyl benzene	ODE	Ordinary differential equation
NPC	Nanoporous carbon; Normalized photocurrent	OEC	Oxygen evolving complex
NPGM	Non-precious metal group	OEM	Original equipment manufacturer
NPMC	Non-precious metal catalyst	OER	Oxygen evolution reaction
NPD	Neutron powder diffraction	OGMC	Ordered graphitic mesoporous carbon
NPDF	Neutron powder diffraction	OH [•]	Hydroxyl radical
NPM	Nanostructured polymeric materials; Non-precious metal	O&M	Operation and maintenance
		OMC	Ordered mesoporous carbon
		Ω	Ohm(s)

Ωcm^2	Ohm(s)-square centimeter	PCF	Polycarbonate film
ONR	Office of Naval Research	PCHD	Poly(cyclohexadiene)
ORF	Opening Reading Frame indicating the occurrence of a protein coding region in the DNA sequence	PCI	Pressure-composition isotherm
ORNL	Oak Ridge National Laboratory	PCL	Polycaprolactone
ORNL-HTML	Oak Ridge National Laboratory High Temperature Materials Laboratory	PCM	Power control module
ORR	Oxygen reduction reaction	PCN	Porous coordination network
OSC	Oxygen storage capability	P-C-P	Phosphorus-carbon-phosphorus
OSHA	Occupational Safety and Health Administration	PCR	Polymerase chain reaction
OSM	Optical scatterfield microscopy	PCS	Power conditioning system
o-SWNH	Oxidized single-walled nanohorn	PCT, P-C-T	Pressure-concentration-temperature
OSU	Ohio State University	PCTFE	Polychlorotrifluoroethylene
OSU	Oregon State University (Microproducts Breakthrough Institute)	Pd	Palladium
OTM	Oxygen transport membrane	PdA	Phenyldiacetylene
P	Phosphorus	PdAg	Palladium-silver alloy
P	Pressure	Pd-ACF	Pd-modified activated carbon fibers
Pa	Pascal(s)	Pd-CR	Palladium-based chemical resistor
PA	Phosphoric acid, Phenylacetylene; Polyamide	PdCu, Pd-Cu	Palladium-copper alloy
PAA	Poly(acrylic acid)	PdCuTM	Palladium copper transition metal
P&D	Pickup and delivery	PDF	Probability density function; Pair distribution function
PAD	Polymer-assisted deposition	PdHg/CF	Carbon foam doped with palladium-mercury compound
PADD	Petroleum Administration for Defense District	PDI	Polydispersity index
PAES	Poly(arylene-ether-sulfone)	Pd-MIS	Palladium-based metal-insulator-semiconductor
PAFC	Phosphoric acid fuel cell	PDMS	Polydimethylsiloxane
P&ID	Piping and instrumentation diagram	PDS	Potentiodynamic scan
PAN	Peroxyacetyl nitrate; Polyacrylonitrile	PDU	Process development unit
PANI	Polyaniline	PE	Polyelectrolyte; Polyethylene
PAN-MA	Polyacrylonitrile with methyl acrylate	PEC	Photoelectrochemical; Photoelectrocatalyst; Photoelectrochemical cell
PAN-VA	Polyacrylonitrile with vinyl acetate	PECH	Polyepichlorohydrin
PA/PBI	Phosphoric-acid-doped polybenzimidazole	PECVD	Plasma-enhanced chemical vapor deposition
PAR	Photosynthetically-active radiation	PED	Pulsed electrodeposition
PAS	Photoactive semiconductor; Photo acoustic	PEDOT:ClO ₄	Poly(3,4-ethylenedioxythiophene):perchlorate
Pb	Lead	PEEK	Polyether ether ether ketone
PB	Polyborazylene	PEFC	Polymer electrolyte fuel cell; Proton exchange fuel cell
PBI	Polybenzimidazole	PEG	Polyethylene glycol
PBPDSA	poly(biphenylene disulfonic acid)	PEGMEMA	Monomethoxypoly(ethyleneglycol) methacrylate
P-C	Pressure-composition	PEGS	Prototype electrostatic ground state
PC	Polycarbonate	PEI	Polyetherimide; Polyethylene imine
PCA	Pyrenecarboxylic acid	PEKK	Poly (ether ketone ketone)
PCE	Perchloroethylene	PEM	Proton exchange membrane; Polymer electrolyte membrane

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PEMFC	Polymer electrolyte membrane fuel cell; Proton exchange membrane fuel cell	PHEV	Plug-in hybrid electric vehicle
PEN	Polyethylene naphthalate	PHI	Perhydro-indolizidine
PEO	Poly(ethylene oxide)	PHIP	Para-hydrogen induced polarization
PES	Polyether sulfone	PHMI	Perhydro-methylindole
PES	Proton Energy Systems, Inc.	PhOH	Phenol
PES	Polyethersulfone	PI	Principal investigator
PET	Polyethylene terephthalate	PI	Polyimide
PetF1	<i>Synechocystis</i> host ferredoxin	P&ID	Piping and instrumentation diagram; Process and instrumentation diagram
PEV	Plug-in electric vehicle	PIL, pIL	Protic ionic liquid
PF	Perfluoro	PIM, pIM	Protic ionic membrane
PFA	Perfluoroalkoxy (a type of fluoropolymer)	pK _a	Acid dissociation constant
PFA	Polyfurfuryl alcohol	PLC	Programmable logic controller
PFAC	PFA-derived carbon	PLLA	Poly-L-lactic acid
PFAE	Perfluoroalkylether	PLP	Prepared Lewis pair
PFC	Polymer electrolyte membrane fuel cell	PLRS	Planar laser Raleigh scatter
PFCS	Poly-generative fuel cell systems	PLS	Polymer-layered silicate
PFD	Process flow diagram	PM	Precious metal such as platinum
PFGB	Perfluorinated guanidine base	PM	Particulate matter
PFG-NMR	Pulse field gradient nuclear magnetic resonance	PMG	Glycidyl methacrylate-type copolymer
PFGSE	Pulse field gradient spin echo	PMMA	Poly(methyl methacrylate)
PFGSE NMR	Pulsed field gradient spin echo nuclear magnetic resonance	PND	Polymerized nitrogen donor
PFIA	Perfluoro imide acid	PNNL	Pacific Northwest National Laboratory
PFPO	Perfluorinated propylene oxide	pO ₂	Oxygen partial pressure
PFPO-PSS	Poly(perfluoropropylene oxide)-b-poly(styrene sulfonate)	POC	Proof of concept
PFSA	Perfluorinated sulfonic acid, perfluorosulfonic acid, poly(fluorosulfonic acid)	POCOP	<i>P,P</i> -bis(1,1-dimethylethyl)-3-[[<i>bis</i> (1,1-dimethylethyl)phosphino]oxy]phenyl ester
PFSI	Perfluorosulfonate ionomer	POF	Polymeric-organic framework; Porous organic framework
PFSHQ	2-(5-fluorosulfonyl-3-oxaocetafluoropentyl)-1,4-dihydroxy-benzene	POM	Polyoxometallate
PG	Propylene glycol	POP	Porous organic polymers
PGAA	Prompt-gamma activation analysis	POSS	Polyhedral oligomeric silsesquioxane
PGE	Platinum group element	POX	Partial oxidation
PGM	Precious group metal; Platinum-group metal	PP	Polyphosphazene; Polypropylene; Poly(phenylene)
PGSE	Pulsed-field gradient spin-echo	PPA	Polyphosphoric acid; Polyphthalamide
PGV	Puna Geothermal Ventures	ppb	Part(s) per billion
pH	Power of the hydronium ion	ppbv	Part(s) per billion by volume
<i>p</i> -H ₂	Para-hydrogen	PPDSA	Poly (p-phenylene disulfonic acid)
Ph ₃ SnCl	Triphenyltin chloride	PPE	Porous polyethylene
Ph ₃ SnSnPh ₃	Hexaphenyldistannane	PPI	Plug Power, Inc.; Pore(s) per inch
PHA	Process hazard analysis; Preliminary hazard analysis	ppm, PPM	Part(s) per million
PHEC	Perhydro-ethylcarbazole	ppmv	Part(s) per million by volume
		ppmw	Part(s) per million by weight
		PPN	Porous polymer network
		PPO	Phenyl phosphine oxide

PPOR	Metalloporphyrin porous organic polymer	Pt/AX-21	Pt-doped microporous carbon AX-21
P-POSS	Phosphonic acid polyhedral oligomeric silsesquioxane	Pt/C	Platinum/carbon
PPS	Polyphenylene sulfide	PTC	Production tax credit
PPSA	Poly (p-phenylene sulfonic acid)	PTFE	Teflon [®] – poly-tetrafluoroethylene
PPSA	Partial pressure swing adsorption	Pt-FePO	Platinum iron phosphate
PPSU	Polyphenylsulfone	PTM	Proton transport membrane
PPy	Polypyrrole	PtML	Platinum monolayer
Pr	Praseodymium	Pt-MM	Platinum group mixed metal
PR	Pressure ratio	Pt-NH	Platinum decorated carbon nano-horns
PRA	Probabilistic risk assessment	PtO	Platinum oxide
PRD	Pressure relief device	PtO ₂	Platinum dioxide
PrOx	Preferential oxidation	PtRu	Platinum ruthenium
PRSV	Peng-Robinson Stryjek-Vera	Pt-SWNH	Platinum decorated single-walled nanohorns
PS	Proton sponge (bis- (dimethylamino) naphthalene)	Pt-TaPO	Platinum tantalum phosphate
PS	Polysiloxane	PTTPP	Poly-tetrakis(3,5-dithiophen-2-ylphenyl)-porphyrin
PSA	Pressure swing adsorption, adsorber	PTW	Pump to wheels
PSAT	Powertrain Systems Analysis Toolkit, a vehicle simulation software package developed at Argonne National Laboratory	PV	Photovoltaic; Present value
PSD	Particle size distribution, pore size distribution	PVA	Polyvinyl alcohol
PSEPVE	Perfluoro (4-methyl-3,6-dioxaoct-7-ene) sulfonyl fluoride	PVC	Polyvinyl chloride
PSf	Poly(arylene ether sulfone)	PVD	Physical vapor deposition
psi, PSI	Pound(s) per square inch	PVDC	Polyvinylidene chloride
PSI	Photosystem I	PVDF	Polyvinylidene fluoride
psia	Pound(s) per square inch absolute	PVP	Polyvinylpyrrolidone
psid	Pound(s) per square inch differential	PVPP	Polyvinyl pyridinium phosphate
psig, PSIG	Pound(s) per square inch gauge	PVT, P-V-T	Pressure-Volume-Temperature
PSOFC	Planar solid oxide fuel cell	PXRD	Powder X-ray diffraction
PSS	Porous stainless steel; Potentiostatic scan	PyC	4-pyrazole carboxylate
PSU	Polysulfone	PzDC	2,8-pyrazole dicarboxylate
PSU	Pennsylvania State University	Q	Neutron momentum transfer
Pt	Platinum	Q1, Q2, Q3, Q4	Quarters of the year
PT	Phosphazene trimer	QC	Quality control
P-T	Pressure-temperature	QCM	Quartz crystal microbalance
Pt ₃ Co	Platinum-cobalt alloy	QE	Quantum efficiency
Pt ₃ Fe	Platinum-iron alloy	QENS	Quasielastic neutron scattering
Pt ₃ Ni	Platinum-nickel alloy	QLRA	Qualitative risk analysis
PTA	Phosphotungstic acid	QMC	Quantum Monte Carlo
Pt/AC/BC/IRMOF-8	Isorecticular metal organic framework (MOF) doped with platinum supported on activated carbon, and further coupled to MOF with a bridging compound	QNS	Quasielastic neutron scattering
		QRA	Quantitative risk assessment
		qRT-PCR	Quantitative reverse transcriptase-polymerase chain reaction
		Q _{st}	Isosteric heat of adsorption
		R	Universal or ideal gas constant, 8.314472 J · K ⁻¹ · mol ⁻¹
		RAMAN	A spectroscopic technique

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RAS	Russian Academy of Sciences	RR	Round robin
RBS	Rutherford back scattering	RRDE	Rotating ring disc electrode
RC	Resistance-capacitance; Research cluster	RSOFC	Reversible solid oxide fuel cell
RCD	Rated current density	RT	Room temperature
RCS	Regulations codes and standards	RTD	Resistive temperature device
RCSWG	Regulations, Codes, and Standards Working Group	RTIL	Room temperature ionic liquid
Ret	Charge transfer resistance	RTO	Ruthenium-titanium oxide
RCWA	Rigorous couples waveguide analysis	Ru	Ruthenium
R&D	Research and development	s	Second(s)
RD&D, R,D&D	Research, development & demonstration	S	Siemen(s)
RDE	Rotating disk electrode	S	Sulfur
Re	Rhenium	-S	Sulfur-deprived
ReaxFF	Reactive force field large-scale molecular dynamic calculations	SA	Specific amperage
REC	Renewable energy credit	SA	Surface area
RED	Reverse electro dialysis	SA	Sulfur-ammonia thermochemical water-splitting cycle; System Architect
REWP	Renewable Energy Working Party	SAC	Super-activated carbon
Rf	Generic fluoroalkyl group	SAE	SAE International, originally known as the Society of Automotive Engineers
RF, rf	Radio frequency	SAFC	Solid acid fuel cell
RFC	Regenerative fuel cell	SAH	Sodium aluminum hydride
RFP	Request for proposals	SAM	Scanning Auger microscopy
RFT	Reactive flow-through	SAMPE	Society for the Advancement of Material and Process Engineering
RGA	Residual gas analyzer (analysis)	SANS	Small angle neutron scattering
Rh	Rhodium	SAS	Styrene-acrylonitrile-vinylsulfate
RH	Relative humidity	SASSP	Solvent assisted solid state processing
RHE	Reference hydrogen electrode; Reversible hydrogen electrode	SAXS	Small angle X-ray scattering
RHLC	Relative humidity/load cycle test	SBAB	Sec-butylamineborane
ρ_a	Apparent density of activated carbon	S_{BET}	BET specific surface area
ρ_{ad,H_2}	Adsorbate hydrogen density in micropores	SBH	Sodium borohydride
RIXS	Resonant inelastic X-ray scattering spectra	SBIR	Small Business Innovation Research
RMS	Root mean square	Sc	Scandium
RNA	Ribo nucleic acid	S/C	Steam to carbon ratio
RNG	Renewable natural gas	SCC	Stress corrosion cracking
ROI	Return on investment	sccm, SCCM	Standard cubic centimeter(s) per minute
ROM	Rough order of magnitude	SCCV	Steel/concrete composite vessel
ROMP	Ring-opening metathesis polymerization	SCE	Saturated calomel electrode
ROW	Right of way	SCF, scf	Standard cubic feet; Supercritical fluid
RPC	Ruthenium-polypridyl complex	scfd	Standard cubic feet per day
RPI	Rensselaer Polytechnic Institute	SCFH, scfh	Standard cubic feet per hour
rpm	Revolution(s) per minute	SCFM	Standard cubic feet per minute
RPN	Risk priority number	S/cm	Siemen(s) per centimeter
RPS	Renewable portfolio standard	SCOF	Single cell with open flowfield
RPSA	Rapic pressure swing adsorption	SCR	Selective catalytic reduction; Semi-conductor rectifier

ScSZ	Scandia-stabilized zirconia	SLMA	Sr- and Mn-doped LaAlO ₃
SD	Standard deviation; System dynamics	SLPH	Standard liter(s) per hour
SDAPP	Sulfonated Diels-Alder polyphenylene	SLPM	Standars liter(s) per minute
SDAPPe	Sulfonated Diels-Alder polyphenylene ether	slpm, slm, sL/min	
SDC	Samarium-doped ceria		Standard liter(s) per minute
sDCDPS	3,3'-disulfonate-4,4'-dichlorodiphenylsulfone	SLT	Strontium-doped lanthanum titanate
SDE	SO ₂ -depolarized electrolyzer	SMART	Specific, measurable, attainable, relevant, timely
SDO	Standards development organization	SMR	Steam methane reformer; Steam methane reforming
Se	Selenium	SMR-ECM	Steam methane reformer with electrochemical purifier
SE	Secondary electron; spectroscopic ellipsometry	SMR-PSA	Steam methane reformer with pressure swing adsorption
sec	Second(s)	SMT	Single-molecule trap
SECA	Solid State Energy Conversion Alliance	Sn	Tin
SECM	Scanning electrochemical microscope	SNG	Substitute natural gas
SEM	Scanning electron microscopy; Scanning electron microscope	SNL	Sandia National Laboratories
SEOS	Simple equation of state	SNLL	Sandia National Laboratory Livermore
SERA	Scenario Evaluation, Regionalization, and Analysis	SnO	Tin oxide
SERC	Schatz Energy Research Center	SnO ₂	Tin oxide
SET	Surface energy treatment	SNR	Signal-to-noise ratio
SF	Safety factor; Polystyrene-b-PFPO	SNS	Spallation neutron source
SF ₆	Sulfur hexafluoride	SNTT	Spiral notch torsion test
SFA	Sulfonic acid	SO ₂	Sulfur dioxide
SFC2	SrFeCo _{0.5} O _x	SO ₃	Sulfur trioxide
SFM	Sr ₂ Fe _{1.5} Mo _{0.5} O _{6-δ}	SOC	State-of-charge
SFT	Sr-Fe-Ti oxide	SOEC	Solid oxide electrolysis cell; Solid oxide electrolyzer cell
SFTI	Sr _{0.1} Fe _{0.9} Ti _{0.10} O _x	SOFC	Solid oxide fuel cell
SG	Shale gas	SOFEC	Solid oxide fuel-assisted electrolysis cell
SGD	Spontaneous galvanic displacement; System gravimetric density	SOM	Solid-oxide oxygen-ion-conducting membrane
SGIP	Self-Generation Incentive Program	SORFC	Solid oxide regenerative fuel cell
Sh	Sherwood	SOTA	State of the art
SHE	Standard hydrogen electrode	SOW	Statement of work
Si	Silicon	SOx	Oxides of sulfur
S-I	Sulfur-iodine	sPAES	Sulfonated poly(arylene ether sulfone)
SI	Sulfur-iodine cycle; Spectrum image	SPE	Solid phase epitaxial
Si ³ N ⁴	Silicon nitride	SPEEK	Sulfonated poly(ether ether ketone)
SiC	Silicon carbide	SPEK	Sulfonated poly-etherketone-ketone
SiCN	Silicon carbonitride	SPEKK	Sulfonated polyether(ether ketone ketone)
SIMS	Secondary ion emission spectroscopy	SPEX	Type of milling machine
Si-NS	Silica nanosprings	SPM	Scanning probe microscope
SiO ₂	Silicon dioxide	sPOSS	Sulfonated octaphenyl polyhedral oligomeric silsesquioxanes
SIU	Southern Illinois University		
sL	Standard liter (0°C, 1 atm)		
SLAC	Stanford Linear Accelerator Center		

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S-PPSU	Sulfonated polyphenylsulfone	t	Time
SPS	Spark plasma sintering	$T_{1\text{bar}}$	Temperature at which equilibrium pressure of hydrogen is 1 bar for a hydrogen exchange reaction
sq. in.	Square inch(es)		
Sr	Strontium	Ta	Tantalum
SR	Steam reformer; Steam reforming; Salinity ratio; Stoichiometric ratio	TA	Terephthalic acid
SRNL	Savannah River National Laboratory	TAG	Technical Advisory Group
SrO	Strontium oxide	TAMU	Texas A&M University
SRR	Solar receiver-reactor	TaON	Tantalum oxynitride
SrTiO ₃	Strontium titanate	TaPO	Tantalum phosphate
SS	Stainless steel	TBAB	Tetra- <i>n</i> -butylammonium bromide
SSA	Specific surface area	TBA ₂ B ₁₂ H ₁₂	Tetra- <i>n</i> -butylammonium dodecahydrododecaborate
SSAWG	Storage System Analysis Working Group	TBABh	Tetra- <i>n</i> -butylammonium borohydride
SSC	Short side-chain; Structure, system, and component	TBA-PF ₆	Tetra- <i>n</i> -butylammonium hexafluorophosphate
SSM	Sacrificial support method	TBD	To be determined
SSNMR	Solid-state nuclear magnetic resonance	TBMD	Tight-binding molecular dynamic
SSRL	Stanford Synchrotron Radiation Laboratory	TC	Templated carbon
SSWAG	Storage System Working Analysis Group	TC	Thermocouple
STCH	Solar thermochemical hydrogen	TCCR	Transparent, conducting and corrosion resistant
STEM	Scanning transmission electron microscopy	TCD	Thermal conductivity detector
STH	Solar-to-hydrogen	TCNE	Tetracyanoethylene
STM	Scanning tunneling microscopy	TCO	Transparent conductive oxide
STMBMS	Simultaneous thermogravimetric modulated beam mass spectrometer	TDDFT	Time-dependent density functional theory
STP	Standard temperature and pressure	TDLAS	Tunable diode laser absorption spectroscopy
STS	Scanning tunneling spectroscopy	TDS	Transitional demand scenario
STTP	Shared Technology Transfer Project	Te	Tellurium
STTR	Small Business Technology Transfer	te	Metric ton or tonne (1,000 kg)
S _u	Ultimate tensile strength	TEA	Triethylamine
SU/SD	Start-up and shut-down	TEA ₂ B ₁₂ H ₁₂	Triethylammonium dodecahydrododecaborate
SUNY-ESF	State University New York Environmental Science Forestry	TEAA	Triethylamine alane adduct
SV	Space velocity	TEAB	Tetraethyl ammonium borohydride
SVD	System volumetric density	TEAH	Tetraethylammonium hydroxide
SW	Square wave	TEAMS	tetraethylammonium methane sulfonic
SWCNH	Single-wall carbon nanohorn	TED	Triethylene-diamine
SWCNT	Single-walled carbon nanotube	TEDA	Triethylenediamine
SWNH	Single-walled nanohorn	TEM	Transmission electron microscopy
SWNT	Single-wall nanotube	TEOA	Triethanolamine
SwRI®	Southwest Research Institute®	TEOM	Tapered element oscillating microbalance
S _y	Yield strength	TEOS	Tetra-ethoxy silane
SYT	Yttrium-doped strontium titanate	tf	Thin film
T	Temperature	Tf	Trifluormethane sulfonate, or triflate anion (CF ₃ SO ₃ ⁻)
T, t	Ton, tonne	TFA	Trifluoromethanesulfonic acid
T	Tesla (unit of magnetic induction)	TFAc	Trifluoroacetate

TFE	Tetrafluoroethylene	TMOS	Tetramethoxy silane
TFMPA	Trifluoromethylphosphonic acid	TMPP	Tetramethoxyphenyl porphyrins
TFMSA	Trifluoromethane sulfonic acid	TMPS	Trimethoxyl phenyl silane
TF-RDE	Thin film rotating disk electrode	TMPyP	Tetramethylpyridylporphine
tf-Si	Thin-film silicon	TNA	Titania nanotube array
TFSI	bis(Trifluoromethylsulfonyl)imide	TNT	Trinitrotoluene
TFVE	Trifluorovinyl ether	TN-T	TiO ₂ nanotubes
Tg, T _g	Glass transition temperature	TOC	Total organic content
TG	Thermogravimetric; Theory Group	TOF	Turnover frequency
TGA	Thermal gravimetric analysis; Thermogravimetric analysis; Thermogravimetric analyzer	ToF-SIMS	Time-of-flight secondary ion spectroscopy
TGA-DSC	Thermo-gravimetric analysis-differential scanning calorimetry	TPA	Tripropylamine; Temperature-programmed adsorption
TGA-MS	Thermogravimetric analysis-mass spectrometer	TPAH	Tetra-n-propylammonium hydroxide
TG-DTA	Thermo-gravimetric/differential thermal analyzer	TPB	Triple phase boundary
THF	Tetrahydrofuran	TPD	Tonne(s) per day
Ti	Titanium	TPD	Thermally programmed desorption; Temperature-programmed desorption
TiCl ₃	Titanium trichloride	TPDMS	Temperature-programmed desorption mass spectrometry
TiF ₃	Titanium trifluoride	TPO	Temperature-programmed oxidation
TiH ₂	Titanium hydride	TPP	Tetraphenyl porphyrin
Ti-IRMOF-16	Titanium (Ti) intercalated IRMOF-16	TPPS	5,10,15,20-tetrakis(4-sulfonatophenyl) porphyrin
TiO ₂	Titanium dioxide (anatase)	TPR	Temperature-programmed reduction
TIVM	Toroidal intersecting vane machine	TPRD	Thermally-activated pressure relief device
TKK	Tanaka Kikinzoku Kogyo K. K.	TPS	3-(trihydroxysilyl)-1-propane-sulfonic acid
TLA, <i>Tla</i>	Truncated light-harvesting chlorophyll antenna	TPV	Through-plate voltage
<i>tlal</i>	Mutant of the <i>Tla1</i> gene (GenBank Assession No. AF534570)	TRA	Technology Readiness Assessment
<i>tlar</i>	Mutant of unknown gene with a truncated light-harvesting chlorophyll antenna	TRAIN	TrainingFinder Realtime Affiliate Network
<i>tlax</i>	Mutant of unknown gene with a truncated light-harvesting chlorophyll antenna	TRL	Technology readiness level
TLCP	Thermotropic liquid crystal polymer	TRO	RuO ₂ -TiO ₂
TM	Tetramethyl bisphenol A	Trityl	Chemical blocking group used to protect amines
TM	Transition metal	tr. oz.	Troy ounce
TMA	Trimethylamine; Trimethylaluminum	TSWS	Temperature-swing water splitting
TMA	Thermal mechanical analyzer	TVS	Twin Vortices Series
TMAA	Trimethylamine alane adduct	TW	Triangel wave
TMAB	Tetramethylammonium borohydride	UC	University of California
TMAH	Tetramethylammonium hydroxide	UCB	University of California, Berkeley
TMB	Trimethylborate	UCF	University of Central Florida
TMEDA	Tetramethylethane-1,2-diamine; <i>N</i> ¹ , <i>N</i> ¹ , <i>N</i> ² , <i>N</i> ² -tetramethylethane-1,2-diamine	UCI	University of California, Irvine
TMG	Tetramethyl guanidine	UCLA	University of California, Los Angeles
		UCONN	University of Connecticut
		UCSB	University of California, Santa Barbara
		UDDS	Urban Dynamometer Driving Schedule
		UEL	Upper explosive limit

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UFL	Upper flammability limit	UT	University of Toledo; University of Tennessee
UGA	University of Georgia, Athens	UTC, UTC FC	United Technologies Corporation Fuel Cells
UH	University of Hawaii	UTC	University of Tennessee, Chattanooga
UHP	Ultra-high purity	UTCP	UTC Power
UHV	Ultra-high vacuum	UTRC	United Technologies Research Center
UIUC	University of Illinois, Urbana-Champaign	UV	Ultraviolet
UL	Underwriters Laboratory	UV-vis	Ultraviolet-visual
ULAM	Ultra-low-angle microtomy	UW	University of Washington
ULSD	Ultra-low sulfur diesel	V	Vanadium
UM	University of Michigan	V	Volt
UMC	Unsaturated metal centers	VA	Vinyl acetate
UMC	Ultramicroporous carbon	VAC	Volts alternating current
UMCP	University of Maryland College Park	VACNTs	Vertically aligned carbon nanotubes
UMSL	University of Missouri, St. Louis	VANTA	Vertically aligned nanotube arrays
UN	United Nations	VASP	Vienna ab initio simulation package
UNB	University of New Brunswick	VaTech	Virginia Polytechnic Institute and State University
UNCC	University of North Carolina at Charlotte	VB	Valence band
UNECE	United Nations Economic Commission for Europe	VBM	Valence band minimum, Valence band maximum
UNLV	University of Nevada, Las Vegas	VC	Vanadium carbide
UNLVRF	UNLV Research Foundation	VC	Vulcan carbon
UNM	University of New Mexico	VDC	Volts direct current
UNR	University of Nevada, Reno	VDF	Vinylidene fluoride
UPD	Underpotential deposition	VDOS	Vibrational density of states
UP-DW	Ultra-pure distilled water	vdW	van der Waals
UPE	Ultra-high molecular weight polyethylene	vdW-DF	van der Waals density function
UPL	Upper potential limit	VFA	Volatile fatty acid
UPS	Ultraviolet photoelectron spectroscopy	VFS	Vehicle fueling station
U.S.	United States	V(H ₂)	Volumetric hydrogen adsorption capacity; Volumetric hydrogen storage capacity
US06	Environmental Protection Agency vehicle driving cycle	VHSV	Volumetric hourly space velocity
USA	United States of America	VHTR	Very high temperature gas-cooled nuclear reactor
USANS	Ultra-small angle neutron scattering	VHTS	Virtual high-throughput screening
USAXS	Ultra-small angle X-ray scattering	VI	Venter Institute
USB	Universal serial bus	V-I, V/I	Voltage-current
USC	University of South Carolina; University of Southern California	VIM/VAR	Vacuum induction melting/vacuum arc remelting
USCAR	United States Council for Automotive Research, U.S. Cooperative Automotive Research	VIR	Voltage-current-resistance
U.S. DRIVE	United States Driving Research and Innovation for Vehicle efficiency and Energy sustainability	VIS	Visible light at 400-700 nm
USFCC	United States Fuel Cell Council	V _{mp}	Micropore volume
USM	University of Southern Mississippi	VMT	Vehicle miles traveled
USTAG	U.S. Technical Advisory Group	VOC	Volatile organic compound, Voltage open circuit
		Vol., vol.	Volume

vol%	Volume percent	WTP	Water transport plate
V_{pore}	Total pore volume	WTPP	Well-to-power plant
VT	Virginia Tech	WTT	Well-to-tank
W	Tungsten	WTW	Well-to-wheels
W	Watt(s)	w/v	Weight by volume
WAXD	Wide-angle X-ray diffraction	WWTP	Waste water treatment plant
WAXS	Wide angle X-ray scattering	X-	an anionic ligand such as chloride
WBS	Work breakdown schedule	XAFS	X-ray absorption fine structure
WC	Tungsten carbon; Tungsten carbide	XANES	X-ray absorption near-edge spectroscopy
W/cm^2	Watt(s) per square centimeter	XAS	X-ray absorption spectroscopy
WDD	Water displacement desorption	XC72	High-surface-area carbon support made by Cabot
W_e, W_e	Watt(s) electric	XES	X-ray emission spectroscopy
WG	Working group	XPS	X-ray photoelectron spectroscopy, X-ray photon spectroscopy, X-ray photoemission spectroscopy, X-ray photoluminescence spectroscopy
WG-12	Working Group 12	XPS-UPS	X-ray photoelectron-ultraviolet photoelectron spectroscopy
WGS	Water-gas shift	XRD	X-ray diffraction
WGSMR	Water-gas shift membrane reactor	XRF	X-ray fluorescence
WGSR	Water-gas shift reactor	Y	Yttrium
Wh	Watt-hour(s)	yr, YR	Year
$W(\text{H}_2)$	Gravimetric hydrogen storage capacity	YSZ	Yttria-stabilized zirconia
W-h/kg	Watt-hour(s) per kilogram	Z	Atomic number
W-h/L, Wh/liter, Wh/L	Watt-hour(s) per liter	ZEBA	Zero Emission Bay Area
WHSV	Weight hourly space velocity	ZEV	Zero emission vehicle
Wind2H2	Wind to hydrogen demonstration project	ZHS	Zinc hydroxystannate
W/kg	Watt(s) per kilogram	ZIF	Zeolitic imidazolate framework
W/L, W/l	Watt(s) per liter	ZIO	Zirconium-doped indium oxide
W/m-K, W/m.K, W/mK	Watt(s) per meter-Kelvin (unit of thermal conductivity)	ZMOF	Zeolite(-type) metal-organic framework
WMO	World Meteorological Organization	Zn	Zinc
WO_3	Tungsten trioxide	ZnO	Zinc oxide
WO_x	Tungsten oxide	ZPE	Zero point energy
WP.29	Working Party 29 - World Forum for Harmonization of Vehicle Regulations	zpp	Zirconium phenyl phosphonate
Wppm	Weight part(s) per million	Zr	Zirconium
WSTF	White Sands Test Facility	ZrO_2	Zirconium dioxide
wt	Weight	ZrSPP	Zirconium phosphate sulfophenylphosphonate
Wt	Watt(s) thermal	ZVI	Zerivalent iron
wt%, wt.%	Weight percent (percent by weight)		
WTP	Well to pump		