XII. Acronyms, Abbreviations, and Definitions

~	Approximately
@	At
°C	Degrees Celsius
°F	Degrees Fahrenheit
Δ	Change, delta
ΔG	Gibbs free energy of reaction
ΔH	Enthalpy of reaction, Enthalpy of hydrogenation
ΔH°_{f}	Standard heat of formation
ΔK	Stress intensity factor
ΔP	Pressure drop, pressure change
≈	Equals approximately
>	Greater than
≥	Greater than or equal to
<	Less than
≤	Less than or equal to
µ	Micro (one-millionth; 0.000001)
µA	Microampere(s)
$\mu A/cm^2$	Microampere(s) per square centimeter
µc-Si	Microcrystalline silicon
µg	Microgram(s)
µCHP	Micro-combined heat and power
µCHX	Microscale combustor/heat exchanger
µm	Micrometer(s); micron(s)
µM	Micromolar
µmol	Micromole(s)
$\mu\Omega\text{-}cm^2$	Micro-ohm(s)-square centimeter
µV	Microvolt(s)
η	Viscosity
#	Number
Ω	Ohm(s)
Ω/cm^2	Ohm(s) per square centimeter
$\Omega\text{-}cm^2$	Ohm-square centimeter(s)
%	Percent
®	Registered trademark
$	United States dollars
^{11}B-NMR	Boron 11 nuclear magnetic resonance
1-D, 1D	One-dimensional
1Q	First quarter of the fiscal year
2-D, 2D	Two-dimensional
2Q	Second quarter of the fiscal year
3-D, 3D	Three-dimensional
3DSM	Dimensionally stable membrane with 3-dimensional porous support
3-L	Three-layer
3Q	Third quarter of the fiscal year
4Q	Fourth quarter of the fiscal year
5-L	Five-layer
6FBPS0	Hexafluoro biphenol sulfone
6FCN-x	Hexafluoro bisphenol A based disulfonated polybenzonitrile (H+ form) (x denotes degree of sulfonation)
6FK	Hexafluoro ketone; Partially fluorinated poly(arylene ether ketone)
6FPAEB	Hexafluoro bisphenol a benzonitrile
8YSZ	8 mol% yttria-stabilized zirconia
A	Ampere(s), amp(s)
Å	Angstrom(s)
AAC	Advanced anode catalyst
AB	Ammonia-borane, NH_3BH_3
ABH_2	Ammonium borohydride, NH_4BH_4
ABS	American Bureau of Shipping
AC	Alternating current; Activated carbon
A-CCC	Activated carbon composite catalyst
ACF	Activated carbon fibers
A/cm^2	Amps per square centimeter
ACN	Acetonitrile
ACNT	Aligned carbon nanotube
ADG	Anaerobic digester gas
AEM	Anion exchange membrane; Analytical electron microscopy
AEO	Annual Energy Outlook
AFDC	Alternative Fuels Data Center
AFM	Atomic force microscopy; Anti-ferromagnetic
AFP	Automated fiber placement
Ag	Silver
AGC	Activated graphitic carbon
AgCl	Silver chloride
A-h	Amp-hour(s)
AHJ	Authorities having jurisdiction
AISI	American Iron & Steel Institute
AIST	Japanese National Institute of Advanced Industrial Science and Technology
AK	Alkali
a.k.a.	Also known as

Al	Aluminum
Al_2O_3	Aluminum oxide
Al-AB	Aluminum-ammonia-borane
$AlCl_3$	Aluminum chloride
ALD	Atomic layer deposition
AlH_3	Aluminum hydride; Alane
ALS	Advanced Light Source at Lawrence Berkeley National Laboratory
ALT	Accelerated life test
AM	Air mass
AM 1.5	Air Mass 1.5 solar illumination
AM1.5G	Air Mass 1.5 Global (solar spectrum)
AMBH	Amine metal borohydride
AMC	Aminomethyl-cyclohexane
AMFC	Anion exchange membrane fuel cell; Alkaline membrane fuel cell
AMR	Annual Merit Review
AN	Acrylonitrile
ANL	Argonne National Laboratory
ANOVA	Analysis of variance
ANSI	American National Standards Institute
A_o	Arrhenius constant, ml/[cm^2-min-atm½]; Availability
APCI, APCi	Air Products and Chemicals, Inc.
APR	Aqueous-phase reforming
APU	Auxiliary power unit
AQMD	Air Quality Management District
Ar	Argon
AR	Areal resistance
ARPA-E	Advanced Research Projects Agency–Energy
ARRA	American Recovery and Reinvestment Act
As	Arsenic
ASAXS	Anomalous small-angle X-ray scattering
a-Si	Amorphous silicon
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
ASTM	ASTM International, originally known as the American Society for Testing and Materials
AT	Ammonia triborane
at%	Atomic percent
atm	Atmosphere(s)
ATM-PP	Benzyl trimethyl ammonium functionalized poly(phenylene) anion exchange membrane
ATP	Adenosine triphosphate; Advanced Technology Program
ATPase	Adenosine triphosphatase
ATR	Autothermal reformer; Autothermal reforming; Attenuated total reflection
ATR-FTIR	Attenuated total reflectance Fourier transform infrared
a.u.	Arbitrary units
Au	Gold
AuS	Gold sulfide
$AuSnO_x$	Gold supported on hydrous tin oxide
$AuTiO_x$	Gold supported on titanium oxide
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
Avg	Average
AZO	Aluminum zinc oxide
^{11}B-NMR	Boron 11 nuclear magnetic resonance
B	Boron
B_2O_3	Boron oxide; Diboron trioxide
Ba	Barium
BAM	Bundesanstalt für Materialforschung und -prüfung (Federal Institute for Materials Research and Testing)
Bara	Bar absolute
barg	Bar gauge
BCC	Body-centered cubic
BCN	Boron carbon nitride
BDC	Benzenedicarboxylic acid
Be	Beryllium
BES	Basic Energy Sciences office within the DOE Office of Science
BESS	Battery energy storage system
BET	Brunauer-Emmett-Teller surface area analysis method
BEV	Battery electric vehicle
BFZ0	$BaFe_{0.975}Zr_{0.025}O_3$
BFZ1	$BaFe_{0.90}Zr_{0.10}O_3$
B-G	Boron doped graphitic material
BG-DW	65% bio-glycol-35% distilled water

B-H	Boron/hydrogen bond
B-H, BH, BH_4	Borohydride
BHP	Butyl perhydropyrolidine
Bi	Bismuth
BLASTP	Basic Local Alignment Search Tool – Protein
BM	Base metal
bmimBF_4	1-butyl-3-methyl-imidazolium tetrafluoroborate
bmimCl	1-butyl-3-methyl-imidazolium chloride
bmimOTf	1-butyl-3-methyl-imidazolium triflate
bmimPF_6	1-butyl-3-methyl-imidazolium hexafluorophosphate
BMPFFP	1-butyl-1-methyl-pyrrolidinium tris(pentafluoroethyl)trifluorophosphate
BN	Boron-nitrogen
BNH	Boron-nitrogen-hydrogen
BNHx	Dehydrogenated ammonia-borane
BNL	Brookhaven National Laboratory
BNNT	Boron nitride nanotubes
B-O	Any oxidized boron species, borate
Boc	Tert-butoxycarbonyl
BOC	Best of class
$B(OH)_3$	Boric acid
BOL	Beginning of life
BOP, BoP	Balance of plant
BOT	Beginning of test
BP	Bisphenol; Biphenyl
bpe	Bis(4-pyridyl)ethane
BPEE	1,2-bipyridylethene
BPDC	Biphenyl-4,4’-dicarboxylate
BPP	Bipolar plate
BPPPO	Biphenol-based phenyl phosphine oxide
BPPPO-35	Biphenol-based phenyl phosphine oxide copolymer, 35% molar fraction of disulfonic acid unit (35% level of sulfonation)
BPS	Ballard Power Systems
BPS	Bi Phenyl Sulfone
BPS100	Fully disulfonated poly(arylene ether sulfone)
BPSH	Block polysulfone ether polymer; Bi Phenyl Sulfone: H Form
BPSH-30	Biphenyl sulfone H form, 30% molar fraction of disulfonic acid unit (30% level of sulfonation)
BPSH-x	BiPhenyl based disulfonated polySulfone (H+ form) (x denotes degree of sulfonation)
BPVC	Boiler and Pressure Vessel Code
BPVE	Perfluorocyclobutane-biphenyl vinyl ether
BPVE-6F	Perfluorocyclobutane-biphenyl vinyl ether hexafluoroisopropylidene
BPy	2,2’-bipyridine
BPY	4,4’-bypyridine
bpydc	Bipyridine dicarboxylate
Br	Bromine
Br_2	Diatomic bromine
BTB	1,3,5-benzenetribenzoate
BTC	1,3,5-benzenetricarboxylate
BTE	4,4’,4’’-(benzene-1,3,5-triyltris(ethyne-2,1-diyl))tribenzoate
BTMA	Benzyltrimethylammonium
BTT	Benzene tris-tetrazole
BTTCD	Octa-carboxylate ligand
BTU, Btu	British thermal unit(s)
Bu_3SnCl	Tributyltin chloride
$Bu_3SnSnBu_3$	Hexabutyldistannane
BV	Benzyl viologen
BxHy	Polyhedral boranes
BZYC	$BaZr_{0.1}Ce_{0.7}Y_{0.1}Yb_{0.1}O_{3-\delta}$
C	Carbon; Couloumb
C_2H_4	Ethylene
C_2H_6	Ethane
C_3H_8	Propane
Ca	Calcium
CA	Carbon aerogel; Chronoamperometry
$CaBr_2$	Calcium bromide
$CaCO_3$	Calcium carbonate
CAD	Computer-aided design
CAE	Computer-assisted engineering
CAER	Center for Applied Energy Research
CaFCP	California Fuel Cell Partnership
CaI	*Clostridium acetobutylicum* hydrogenase
CaO	Calcium oxide
CARB	California Air Resources Board
CaS	Calcium sulfide
CaSFCC	California Stationary Fuel Cell Collaborative
CB	Conduction band; Carbon black
CBECS	Commercial Building Energy Consumption Survey
CbHS	Carbon-based hydrogen storage
CBM	Conduction band minimum
CBN	Carbon-boron-nitrogen
CBS	Casa Bonita strain; Complete basis set
cc	Cubic centimeter(s)

CCC	Carbon composite catalyst
CCD	Charge-coupled device; Catalyst coating on decal
CCDM	Catalyst coating on diffusion media
cc/g cat/hr	Cubic centimeter(s) per gram catalyst per hour
CcH2	Cryo-compressed hydrogen
CCHSS	Complex Compound Hydrogen Storage System
CCL	Cathode catalyst layer
CCM	Catalyst-coated membrane
cc/min, ccm	Cubic centimeters per minute
ccp	Cubic close-packing
CCS	Carbon capture and storage
CC&S	Carbon capture and sequestration
CCVJ	9-([E]-2-carboxy-2-cyanovinyl)julolidine
Cd	Cadmium
CD	Current density; Charge depleting; Cathode dewpoint
Cdl	Double layer capacitance
cDNA	Complementary DNA
CDO	Code development organization
CDP	Composite data product
CdS	Cadmium sulfide
C-DSM™	Chemically etched dimensionally stable membrane
Ce	Cerium
CEA	Commissariat à l'Energie Atomique
CEC	California Energy Commission
CEM	Compressor expander motor (module)
CeO_2	Ceric oxide
CF	Carbon fiber; Carbon foam
CFC	Chlorofluorocarbon
CFD	Computational fluid dynamics
CFF	Complex coolant fluid
cfm	Cubic feet per minute
CGA	Compressed Gas Association
CGH2	Compressed gaseous hydrogen
CGM	Charge-generating material
CGO	Cerium gadolinium oxide, Gd-doped CeO_2
CGS	Copper gallium diselenide, $CuGaSe_2$
$CGSe_2$	Copper gallium diselenide
CH	Chemical hydride; Chemical hydrogen
cH_2	Compressed hydrogen gas
CH_4	Methane
CHEX	Continuous catalytic heat exchanger
CHG	Compressed hydrogen gas
CHHP	Combined heat, hydrogen, and power
Chl	Chlorophyll
CHMC1	Test Method for Evaluating Material Compatibility for Compressed Hydrogen Applications–Phase I-Metals
CHP	Combined heat and power
CHPFC	Combined heat and power fuel cell
CHS	Chemical hydrogen storage
CHSCoE	Chemical Hydrogen Storage Center of Excellence
$CIGSe_2$	Copper indium gallium diselenide
CIGS	Copper indium gallium diselenide
Cl	Chlorine
CL	Catalyst layer; ε-caprolactone
C-L	Circumferential-longitudinal
cm	Centimeter
CM	Controls module
cm^2	Square centimeter
CMO	Conductive metal oxides
CMWNT	Carbon multi-walled nanotube
CN	Carbon-nitrogen
CNC	Carbon nanocage
CNF	Carbon nano-fiber
CNG	Compressed natural gas
CNT	Carbon nanotube
Co	Cobalt
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_{2e}	Carbon dioxide equivalent
COD	Chemical oxygen demand
COE	Cost of electricity
COF	Covalent-organic framework
COF_2	Carbonyl fluoride
COGS	Cost of goods sold
COMSOL	Multiphysics modeling and engineering simulation software
COPV	Composite overwrapped pressure vessel
COS	Carbon oxysulfide; Carbonyl sulfide
COx	Oxides of carbon
c_p	Specific heat
cp	Commercial purity
cP	Centipoise
CpI	*Clostridium pasteurianum* [FeFe]- hydrogenase
CPMAS	Cross polarization magic angle spinning

CPO, CPOX	Catalytic partial oxidation
c.p.s.	Counts per second
CPU	Computer processing unit
CPV	Composite pressure vessel
Cr	Chromium
CRADA	Cooperative Research and Development Agreement
CRCC	Corrosion-resistant conducting catalytic
CRTP	Corrosion-resistant transparent protective
Cs	Cesium
C&S	Codes and standards
CSA	Canadian Standards Association; Cell stack assembly
CSMP	Cabot Superior MicroPowders
CSTT	Codes and Standards Tech Team
CSU	California State University
CSULA	California State University, Los Angeles
CT	Computed tomography; Compact tension
CTA	Charge transfer agent
CTAB	Cetyl trimethyl ammonium bromide
CTB	Cyclotriborazane
CTE	Coefficient of thermal expansion
CTS	Charge transfer salt
CTTRANSIT	Connecticut Transit
Cu	Copper
CU	University of Colorado
Cu_2O	Cuprous oxide
$CuBiW_2O_8$	Copper bismuth tungstate
CuBTC	Cu_3(1,3,5-benzenetricarboxylate [BTC])$_2(H_2O)_3$
cu in.	Cubic inch
$CuInGaS_2$	Copper indium gallium sulfide
CuNW	Copper nanowire
CuO	Cupric oxide; Copper(II) oxide
CuTDPAT	Cu_3(2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine)$(H_2O)_3$
$CuWO_4$	Copper tungstate
cu.yd.	Cubic yard(s)
CV	Cyclic voltammetry; Cyclic voltammogram
CVD	Chemical vapor deposition
CVS	Chemical vapor synthesis
CWG	Catalysis Working Group
CWRU	Case Western Reserve University
CY	Calendar year
CZO	Ceria-zirconia
d	Day(s)
D_2	Deuterium
D-A	Dubinin-Astakhov
DAC	Diamond anvil cell
DADB	Diammoniate of diborane, $[(NH_3)_2BH_2][BH_4]$
da/dN	Fatigue crack growth rate
DAKOTA	Design Analysis Kit for Optimization and Terascale Applications
DB	Diborane (B_2H_6)
dB(A)	Decibel(s) A scale
DBBPDSA	4, 4'-dibromobiphenyl 3, 3'-dislufonic acid, monomer
DBPDSA	1, 4-dibromo phenylene 2, 5-disulfonic acid
DC	Direct current
DCTDD	1,8-diazacyclotetradecane-2,7-dione
DDMEFC	Direct dimethyl ether fuel cell
DDP	Detailed Data Product
d_{DR}	Dubini-Radushkevich average micropore diameter
DDR	A zeolite structure code
DEF	Diethylformamide
Deg	Degree
DEGDBE	Diethylene glycol dibutyl ether
ΔB_a	The difference in magnetic induction at high and low applied magnetic fields
ΔG	Gibbs free energy of reaction
ΔH	Enthalpy of reaction; Enthalpy of hydrogenation
$\Delta H°_f$	Standard heat of formation
ΔK	Stress-intensity factor
ΔP	Pressure drop; Pressure change
ΔT	Temperature change
DEMS	Differential electrochemical mass spectroscopy
DFM	Design for manufacturing
DFMA®	Design for Manufacturing and Assembly
DFT	Density functional theory
DGDE	Di-ethylene glycol di-butyl ether
DHBC	2,5-dihydroxybenzene dicarboxylate
DI	Deionized; De-ionized water
DLC	Diamondlike carbon
dL/g	Deciliters per gram
DM	Diffusion media
DMA	Dimethylacetamide
DMAc	Dimethyl acetamide
DMC	Diffusion Monte Carlo; Direct manufactured cost

DMDF	2,5-dimethoxy 2,5-dihydrofuran
DMDS	Dimethyldisulfide
DME	Dimethyl ether; Dimethoxyethane
DMEA	Dimethlethylamine
DMEAA	Dimethlethylamine alane
DMF	n, n-di-methyl formamide
DMFC	Direct methanol fuel cell
dmimMeSO$_4$	1,3-dimethyl-imidazolium methylsulfate
dmpe	Dimethylphosphinoethane
DMPO	5,5-Dimethylpyrroline-N-oxide
DMSO	Dimethyl sulfoxide
DMT	Dimethyltrityl
DMTHF	Dimethyltetrahydrofuran
DNA	Deoxyribonucleic acid
DNG	Desulfurized natural gas
DNI	Direct normal insolation
dobdc	2,5-dioxido benzene-1,4-dicarboxylate
dobpdc	Dioxido-biphenyl-dicarboxylate
DOD	Depth of discharge; Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
DP	Dew point
DRIFTs	Diffuse reflectance infrared Fourier transform spectroscopy
DSC	Differential scanning calorimetry; Dynamic scanning calorimetry
DSM™	Dimensionally stable membrane
DSM-MC	Distance scaling method Monte Carlo
DVBPC	Divinyl aryl ether monomer
DVD	Digital video disk
DVMT	Daily vehicle miles traveled
DWG	Durability Working Group
e^-	Electron
E	Activation energy, kJ/mol
E_0xE_1	Utilization efficiency of incident solar light energy
$E_{1/2}$	Half-wave potential
E85	85%-15% blend of ethanol with gasoline
Ea	Activation energy
EA	Environmental assessment
E_{ad}	Hydrogen adsorption heat
EAN	Ethylammonium nitrate
EASA	Electrochemically active surface area
E-BOP	Electrical balance of plant
EBSD	Electron backscatter diffraction
EC	European Commission; Electro-chemical; Evaporative-cooled; Efficiency of conversion; Electrochemical capacitance
ECA	Electrochemical area
ECB	Ethylcyclobutane
ECC	Electrochemical compressor; Engineered cementitious composite
ECE	Economic Commission for Europe
ECS	Equilibrium crystal shape
ECSA	Electrochemically active surface area; Electrochemical surface area; Effective catalyst surface area
ECV	Electrochemical capacitance voltage
ED	Ethylenediamine
EDA	Ethylene diamine; Energy decomposition analysis
EDAX	Manufacturer of energy dispersive X-ray hardware and software
EDBB	Ethylenediamine bisborane
EDC	Energy distribution curve
edmimCl	2-ethyl-1,3-dimethyl-imidazolium ethylsulfate
EDP	Electrophoretic deposition
EDS	Energy dispersive X-ray spectroscopy; Energy dispersive spectrum
EDTA	Ethylenediamine tetraacetic acid
EDX	Energy dispersive X-ray
EELS	Electron energy loss spectroscopy
EERE	U.S. DOE Office of Energy Efficiency and Renewable Energy
EFR-AHJ	Emergency first responder-authorities having jurisdiction
EFTE	Ethylene-tetrafluoroethylene
e.g.	*Exempli gratia*: for example
EGR	Exhaust gas recirculation
EHC	Electrochemical hydrogen compressor
EHS	Environmental Health and Safety
EIA	Energy Information Administration of the U.S. Department of Energy
EIGA IGC	European Industrial Gases Association/ Industrial Gases Council
EIHP	European Integrated Hydrogen Project
EIS	Electrochemical impedance spectroscopy
EISF	Elastic incoherent structure factor
ELAT®	Registered Trademark of De Nora North America, Inc., covers GDLs and GDEs
EMA	Effective medium approximation
EMF	Electromagnetic field

EMI	Electro magnetic interference
EMPA	Electron microprobe analysis
ENABLE	Energetic neutral atom beam lithography/ epitaxy
ENG	Expanded natural graphite
eNMR	Electrochemical nuclear magnetic resonance
EODC	Electro-osmotic drag coefficient
EOL	End of life
EOT	End of test
EPA	Environmental Protection Agency
EPD	Electrophoretic deposition
EPDM	Ethylene propylene diene monomer
EPHC	Ethylperhydrocarbazole
ePTFE	Expanded polytetrafluoroethylene
ER	Emergency responder
ERW	Electric resistance weld
ES	Energy storage
ESA	Electrochemical surface area
ESEM	Environmental scanning electron microscope
ESE(T)	Eccentrically loaded, single edge tension
ESIF	Energy Systems Integration Facility
et al.	*Et Alii:* and others
ETA	Event tree analysis
etc.	*Et cetera*: and so on
E-TEK	Division of De Nora North America, Inc.
ETFE	Ethylene-tetrafluoroethylene
ETFECS	Extended thin film electrocatalyst structures
EtOH	Ethanol
EU	European Union
eV	Electron volt
EVD	Extreme value distributions
EVOH	Ethylene vinyl alcohol
EVSE	Electric vehicle supply equipment
EW	Equivalent weight
EXAFS	Extended X-ray absorption fine structure analysis
EY	Electrolyzer
F	Fluorine
F	Faraday constant, the amount of electric charge in one mole of electrons (96,485.3383 coulomb/mole)
F^-	Fluorine ion
FA	Furfyl alcohol
FANS	Filter analyzer neutron spectroscopy
FAT	Fleet Analysis Toolkit; Factory acceptance test
FBMR	Fluidized bed membrane reactor
FC	Fuel cell
FCB	Fuel cell bus
FCC	Face-centered cubic; Fuel Cell Catalyst; Fluid catalytic cracking
FCEB	Fuel cell electric bus
FCEV	Fuel cell electric vehicle
FCI	Fixed capital investment
FC POWER	Fuel Cell Power Model
FCPP	Fuel cell power plant
FCS	Fuel cell system
FCSMR	Forecourt steam methane reformer (ing)
FCT	Fuel Cell Technologies
$FCTES^{QA}$	Fuel Cell Testing, Safety and Quality Assurance (an international effort to harmonize fuel cell testing procedures)
FCTO	Fuel Cell Technologies Office
FCTT	Fuel Cell Technical Team
FCV	Fuel cell vehicle
Fd	Ferredoxin
Fe	Iron
FE	U.S. DOE Office of Fossil Energy
Fe_2O_3	Ferric oxide
FEA	Finite element analysis
FEM	Finite element model
FEP	Fluorinated ethylene propylene; Teflon®
FESEM	Field emission scanning electron microscope
fg-ELAT	Fine gradient ELAT
FIB	Focused ion beam
FISIPE	Fibras Acrilicas Portugese
FLC	Frequent driver and long commute
FLiNaK	LiF-NaF-KF eutectic salt
FLP	Frustrated Lewis pair
Fluent	Computer code for computational fluid dynamics
FMEA	Failure modes and effects analysis
FMVSS	Federal Motor Vehicle Safety Standard
^{19}FNMR	^{19}Fluorine nuclear magnetic resonance
FNR	Ferredoxin NADP+ oxidoreductase
FOA	Funding Opportunity Announcement
FOM	Federated object model; Figure of merit
FPA	Fluoroalkyl phosphonic and phosphinic acids
fpi	Fins per inch
fpm	Feet per minute
FPS	Bis(4-fluorophenyl)sulfone; Fuel processing system

FRP	Fiber-reinforced composite piping; Fiber-reinforced polymer; Full rate production
FRR	Fluoride release rate
F-SPEEK	Fluorosulfonic acid of polyetheretherketone
FSW	Friction-stir welding
ft	Feet
FT	Fault tree
ft^2	Square feet
ft^3	Cubic feet
FTA	Federal Transit Administration
FT-IR, FTIR	Fourier transform infrared
FTIR-ATR	Fourier transform infrared attenuated total reflection
FTO	Fluorine-doped tin oxide
FTP, FTP-75	Federal Test Procedure
FWS	Fixed-window scan
FW	Formula weight; Filament winding
FWHM	Full width at half maximum
FY	Fiscal year
FZ	Fusion zone
g	Gram; acceleration of gravity
G	Graphite
Ga	Gallium
GaAs	Gallium arsenic
GADDS	General area diffraction system
gal	Gallon
GaP	Gallium phosphide
GB	Gigabyte
GC	Gas chromatograph; General computational
GC	Glassy, or vitreous carbon: a pure carbon that is amorphous (non-crystalline)
g/cc	Grams per cubic centimeter
GCLP	Grand-canonical linear programming
GCMC	Grand Canonical Monte Carlo
GCMS	Gas chromatograph-mass spectroscopy
GCNF	Graphitized carbon nano-fiber
GCNT	Graphitized carbon nanotubes
GCtool	Software package developed at ANL for analysis of fuel cells and other power systems
Gd	Gadolinium
GDC	Gadolinium-doped ceria
GDE	Gas diffusion electrode
GDL	Gas diffusion layer
GDM	Gas-diffusion media
GDS	Galvanodynamic scan
Ge	Germanium
GES	Giner Electrochemical Systems, LLC
GF	Glass fiber
GFC	Gas flow channel
GFP	Green fluorescent protein
GGA	Generalized gradient approximation
GGE, gge	Gasoline gallon equivalent
GH_2	Gaseous hydrogen
GHG	Greenhouse gas
GHSV	Gas hourly space velocity
GIS	Geographic information system
GJ	Gigajoule(s)
g/kW	Gram(s) per kilowatt
GLACD	Glancing angle co-deposition
GLAD	Glancing angle deposition
GLS	Gas-liquid separator
GLY	Glycerol
Glyme	Dimethoxyethane
gm	Gram(s)
GM	General Motors
gm/day	Gram(s) per day
g/min	Gram(s) per minute
GNF	Graphite nanofiber
GO	Graphene oxide
GODC	Graphene oxide derived carbon
GOF	Graphene-oxide framework
GPa	Gigapascal(s)
GPAT	Global Pathways Resource Analysis Tool
GPC	Gel permeation chromatography
GPS	Global positioning system
GPU	Gas permeation units
GRC	Glass-reinforced concrete
GREC	Graphite reinforced epoxy composite (IM6 continuously wound)
GREET	Greenhouse gases, Regulated Emissions and Energy use in Transportation model
GRPE	Working Party on Pollution and Energy
g/s	Grams per second
GS	Gas switching
GTI	Gas Technology Institute
GTR	Global Technical Regulations
GUI	Graphical user interface
GV	Gasoline vehicle
GVW	Gross vehicle weight
GW	An approximation permitting practical calculation of excitation energies in metals, semi-conductors and insulators

GWe, GW_e	Gigawatt(s) electric
h	Hour(s)
H	Hydrogen
H+	Proton
H^-	Hydride
H_2	Diatomic hydrogen
H2A	Hydrogen Analysis project sponsored by DOE
H_2BPyDC	2,2'-bipyridine-5,5'-dicarboxylic acid
H_2cat	Catechol, 1,2 dihydroxybenzene
H_2-FCS	Stationary fuel cell system designs that co-produce hydrogen
H2FIRST	Hydrogen Fueling Infrastructure Research and Station Technology
H_2(hfipbb)	4,4'-(hexafluoroisopropylidene)bis(benzoic acid)
H2I	Hawaii Hydrogen Initiative
H2-ICE, H_2 ICE	Hydrogen internal combustion engine
H_2Lib	Library of H_2 component models in Simulink®
H_2O	Water
H_2O_2	Hydrogen peroxide
H_2oba	4,4'-oxybis-benzoic acid
H2QWG	DOE Hydrogen Quality Working Group
H_2S	Hydrogen sulfide
H2SCOPE	Hydrogen Station Cost Optimization & Performance Evaluation
H_2SO_4	Sulfuric acid
H2V	Hydrogen vehicle
H_3BBC	1,3,5-tris(4'-carboxy[1,1'-biphenyl]-4-yl-) benzene
H_3BTB	4,4',4''-benzene-1,3,5-triyl-tribenzoic acid
H_3PO_4	Phosphoric acid
HAADF	High-angle annular dark-field
HAADF-STEM	High angle annular dark field scanning transmission electron microscopy
HAMMER	Hazardous Materials Management and Emergency Response
HATCI	Hyundai America Technical Center, Inc.
HAVO	Hawaii Volcanoes National Park
HAZ	Heat-affected zone
HAZID	Hazard Identification Analysis
HAZOP	Hazards and Operational Safety Analysis; Hazards and operability analysis
HB	Hydrazine borane
HBr	Hydrogen bromide
HBTU	o-Benzotriazol-1-yl-N,N,N',N'-tetramethyluronium hexafluorophosphate
HCC	Hybrid cathode catalyst
HCl, HCL	Hydrochloric acid; Hydrogen chloride
$HClO_4$	Perchloric acid
HCN	Hydrogen coordination number
HCNG	Hydrogen-compressed natural gas
HCO_3^-	Bicarbonate
hcp	Hexagonal close-packing
HC&S	Hawaiian Commercial and Sugar Company
HD	Deuterium hydride
HDF	Hydrogen dispensing facility
HDPE	High-density polyethylene
HDS	Hydrogen desulfurization
HDSAM	Hydrogen Delivery Scenario Analysis Model
He	Helium
HE	Hydrogen embrittlement
HEMA	2-hydroxylethyl methacrylate
HEN	Heat exchange network
HEPA	High efficiency particulate air filter
HER	Hydrogen evolution reaction
HES	Hydrogen energy station
HEV	Hybrid electric vehicle
HEX	Heat exchanger
HexCell	Hexagonal heat exchanger
Hf	Hafnium
HF	Hydrogen Fueler; Hydrofluorhydric acid; Hydrogen fluoride; Hartree-Fock
HFB	Hexafluorobenzene
HFC	Hydrogen fuel cell
HFCTF	Hawaii Fuel Cell Test Facility
HFCV	Hydrogen fuel cell vehicle
HFI	Hydrogen Fuel Initiative
HFP	Hexafluoropropylene
HFP	1,1,1,3,3,3 hexafluoro-2-propanol
HFR	High-frequency resistance
HFS	Hydrogen fueling station
HFSS	High-flux solar simulator
HFV	Hydrogen-fueled vehicle
HGEF	Hawaii Gateway Energy Center
HGM	Hydrogen Generation Module
HGMs	Hollow glass microspheres
HGV	Hydrogen gaseous vehicle
HHV	Higher heating value
HI	Hydrogen iodide, hydriodic acid

HIA	Hydrogen-induced amorphization; Hydrogen Implementing Agreement
HIAD	Hydrogen Incidents and Accidents Database
HIB	High-impedance buffer
HIC	Hydrogen-induced cracking
HICE	Hydrogen internal combustion engine
HiPCO, HiPCo	High-pressure carbon monoxide
HIPOC	Hydrogen Industry Panel on Codes
HIx	Blend of hydrogen iodide, iodine, and water
HIZ	Perhydro-indolizidine
HKUST	1 Cu_3(1,3,5-benzenetricarboxylate)$_2$
HLA	High level architecture
HMC	Hyundai Motor Company
HNEI	Hawaii Natural Energy Institute
HNO_3	Nitric acid
HOMO	Highest occupied molecular orbital
HOPG	Highly-ordered pyrolytic graphite
HOR	Hydrogen oxidation reaction
hp	Horsepower
HP	High pressure
HPA	Heteropoly acid
HPA-C	Heteropoly acid
HPC	Highly porous carbon
HPEP	Hydrogen Production Expert Panel
HPIT	Hydrogen-powered industrial truck
HPLC	High-performance liquid chromatography
HPPH	1,6-di(4-hydroxyl)phenylperfluorohexane
HPPS	*N,N*-diisopropylethylammonium 2,2-bis(*p*-hydroxyphenyl) pentafluoropropanesulfonate
HPRD	Hydrogen pressure relief device
HPTB	High Pressure Test Bay
HQS100	Hydroquinone sulfone
hr	Hour(s)
HRA	Home refueling appliance
HRS	Hydrogen refueling station
HR-STEM	High resolution scanning transmission electron microscopy
HRT	Hydraulic retention time
HRTEM	High-resolution transmission electron microscopy
HRXRT	High-resolution X-ray tomography
HS	Hydrogen sorption
HSAC	High surface area carbon
HSC	Database name derived from the letters for enthalpy, entropy, and heat capacity
HSCC	Hydrogen Station Cost Calculator
HSCoE	Hydrogen Sorption Center of Excellence
HSDC	Hydrogen Secure Data Center
HSE	High surface area electrode
HSECoE	Hydrogen Storage Engineering Center of Excellence
HSMCoE	Hydrogen Storage Material Center of Excellence
HSO_4	Bisulfate anion
HSP	Hydrogen safety plan
HSRP	Hydrogen Safety Review Panel
HSSIM	Hydrogen Storage SIMulator
HSU	Hydrogen separation unit
HT	High temperature
HTAC	Hydrogen and Fuel Cell Technical Advisory Committee
HTFC	High-temperature fuel cell
HTFSA	Trifluomethylsulfonic acid
HTGR	High-temperature gas-cooled reactor
HTHX	High-temperature heat exchanger
HTM	High-temperature membrane; Hydrogen transport membrane
HTMWG	High Temperature Membrane Working Group
H-T-NT	Hierarchical TiO_2 nanotubes
HTPEM	High-temperature polymer electrolyte membrane
HTWGS	High-temperature water-gas shift
HTXRD	High-temperature X-ray diffraction
HVAC	Heating, ventilation, and cooling
HWCVD	Hot-wire chemical vapor deposition
HWD	Hot wire deposition
HWFET	Highway Fuel Economy Test
HX	Heat exchanger
HyARC	Hydrogen Analysis Resource Center
HYDA	*Chlamydomonas reinhardtii* [FeFe] hydrogenase
HyDRA	Hydrogen Demand and Resource Analysis
Hydrofill™	GTI hydrogen dispenser filling control algorithm
HyPro, HYPRO	Analysis tool
HYPS	Pumped hydro
HyQRA	Hydrogen quantitative risk assessment
HyRAM	Hydrogen-specific risk assessment toolkit
HyS	Hybrid Sulfur
HySEB	Hydrogen Station Economics and Business
HYSYS®	Process simulation software by Aspentech, computer code for flowsheet analysis

HyTEx	Hydrogen Technical Experimental (database)
HyTRANS	DOE's market simulation model for the transition to hydrogen vehicles
Hz	Hertz
HZM	Hot zone module
i	Current density (mA/cm^2)
I	Current
I_2	Diatomic iodine
I2CNER	International Institute for Carbon-Neutral Energy Research
IBAD	Ion beam assisted deposition
IBS	Ion beam sputtering
I/C	Ionomer to catalyst; Ionomer to carbon
IC	Internal combustion
ICC	International Code Council
ICE	Internal combustion engine
ICEV	Internal combustion engine vehicle
ICMS	Integrated ceramic membrane system
ICP	Inductively coupled plasma
ICPAE	Inductively coupled plasma atomic emission
ICP-AES	Inductively coupled plasma atomic emission spectroscopy
ICP-MS	Inductively coupled plasma mass spectrometry
ICP-OES	Inductively coupled plasma optical emission spectroscopy
ICR	Interfacial contact resistance
ID	Inside diameter
i.e.	*id est*: that is
IE	Intelligent Energy
IEA	International Energy Agency
IEA-HIA	International Energy Agency Hydrogen Implementing Agreement
IEC	International Electrotechnical Commission; Ion exchange capacity, milliequivalents of acid groups per gram of material
IECV	Integrated end cap vessel
IEEE	Institute of Electrical and Electronics Engineers, Inc.
IET	Institute for Energy and Transport
IFC	International Fire Code
IGBT	Insolated-gate bipolar transistor
IGCC	Integrated gasification combined cycle
IGCC-CMR	Integrated gasification combined cycle-catalytic membrane reactor
IGCC-MR	Integrated gasification combined cycle-membrane reactor
IGCC-PBR	Integrated gasification combined cycle-paladium-based reactor
IGT	Institute of Gas Technology
IIC	Industrial, institutional, and commercial
IINS	Inelastic incoherent neutron scattering
IIT	Illinois Institute of Technology
IL	Ionic liquid
ILS	Inter-laboratory study(ies)
ILTA	Ionic liquids tethered to amineboranes
In	Indium
In., in	Inch
in^2	Square inch
INER	Institute of Nuclear Energy Research
INERI	International Nuclear Energy Research Initiative
InP	Indium phosphorus
INS	Inelastic neutron scattering
I-O	Input-output
IOS	Intelligent Optical Systems, Inc.
IP	Induction period; Intellectual property
IPA	Isopthalate; Isopropyl alcohol
IPCC	Intergovernmental Panel on Climate Change
IPCE	Incident photon conversion to electrons; Incident photon conversion efficiency
IPE	Integrated photovoltaic electrolysis
IPES	Inverse photoemission spectroscopy
IPHE	International Partnership for the Hydrogen Economy
IPNS	Intense Pulse Neutron Scattering Facility at Argonne National Laboratory
IQE	Internal quantum efficiency
IR	Infrared
iR	Internal resistance
Ir	Iridium
IRMOF	Isoreticular metal organic framework
IrO_x	Iridium oxide
IRR	Internal rate of return
IRRAS	Infrared reflection-absorption spectroscopy
ISIS	World's leading pulsed neutron and muon source located at the UK Rutherford Appleton Laboratory near Oxford
ISO	International Organization for Standardization
ISO TC197	International Standards Organization Technical Committee
ISS	Ion scattering spectroscopy
ITM	Ion transport membrane

ITO	Indium tin oxide
ITP	Indium tin phosphate
ITWS	Isothermal water splitting
IV	Current-voltage
J	Current; Joule(s)
JARI	Japan Automobile Research Institute
JHQTF	Joint Hydrogen Quality Task Force (U.S. Fuel Cell Council)
JM	Johnson Matthey
JMFC	Johnson-Matthey Fuel Cells, Inc.
JNAIST	Japanese National Institute of Advanced Industrial Science and Technology
JOBS FC	JOBS and economic impacts of Fuel Cells
JOBS H2	JOBS and economic impacts of Hydrogen
JPL	Jet Propulsion Laboratory
JRC	Joint Research Centre
J-V, JV	Current density-voltage
K	Sievert's constant, ml/[cm^2-min-atm½]; Kelvin, absolute temperature; Potassium
kÅ	1,000 angstroms
KAERI	Korea Atomic Energy Research Institute
KAIST	Korea Advanced Institute of Science and Technology
kA/m^2	Kilo-ampere(s) per square meter
kb	Kilo-base pair, a unit of measurement used in genetics equal to 1,000 nucleotides
KBr	Potassium bromide
kcal	Kilocalorie(s)
kcal/mol	Kilocalorie(s) per mole
KeV	Kilo electron volt(s)
kg	Kilogram(s)
kg/d	Kilogram(s) per day
kg/hr	Kilogram(s) per hour
kg/m^3	Kilogram(s) per cubic meter
KH	Potassium hydride
KHTC	Hydrotalcites; Potassium-promoted hydrotalcite
kHz	Kilohertz
K_{IH}	Fracture toughness measured in hydrogen gas
kJ	Kilojoule(s)
KJ	Ketjenblack
K_{JIC}	Fracture toughness
kJ/mol	Kilojoule(s) per mole
km	Kilometer(s)
KMC	Kinetic Monte Carlo
KOH	Potassium hydroxide
kPa	Kilopascal(s)
kph	Kilometer(s) per hour
ksi	1,000 pound-force per square inch
kT/y	Kiloton(s) per year
Kth, K_{th}	Fracture toughness threshold
K_{TH}	Hydrogen-assisted crack growth threshold
kVA	Kilovolt-amp(s) (units of apparent power)
kW	Kilowatt(s)
kWe, kW_e	Kilowatt(s) electric
kWh	Kilowatt-hour(s)
kWh/kg	Kilowatt-hour(s) per kilogram
kWh/L	Kilowatt-hour(s) per liter
kW/kg	Kilowatt(s) per kilogram
kWt	Kilowatt(s) thermal
L, l	Liter(s)
La	Lanthanum
LAGP	Lithium aluminum germanium phosphate
LAH	Lithium aluminum hydride ($LiAlH_4$)
λ	Lambda, hydration number
LAMH	Lithium amide and magnesium hydride
LAMOX	Lanthanum molybdenum oxide (*e.g.*, $La_2Mo_2O_9$)
LANL	Los Alamos National Laboratory
LAO	Lanthanum-modified alumina
LAPS	Large aperture projection scatterometer
LAS	Large aperture scatterometry
lb	Pound(s)
LBM	Lattice Boltzmann method
lbmol	Pound(s)-mole
LBNL	Lawrence Berkeley National Laboratory
LC	Liquid carrier; Low concentration
L-C	Longitudinal-circumferential
LCA	Life cycle assessment; Life-cycle analysis
LCC	Life cycle cost; $La_{0.7}Ca_{0.3}CrO_{3-\delta}$
LCH_2	Hydrogenated liquid carrier; Compressed hydrogen produced from liquid hydrogen
LCHPP	Low Cost Hydrogen Production Platform (DOE Program Title)
LCMS	Liquid chromatography-mass spectroscopy
LCOE	Levelized cost of electricity
L/D	Length to diameter ratio
LDV	Light-duty vehicle
LED	Light emitting diode
LEED	Low-energy electron diffraction
LEL	Lower explosion limit

LFG	Landfill gas
LFL	Lower flammability limit
L/h, l/h	Liter(s) per hour
LH2, LH_2	Liquid hydrogen
LHC	Light-harvesting chlorophyll
LHSV	Liquid hourly space velocity, h^{-1}
LHV	Lower heating value
Li	Lithium
LI	Leaching index
Li_3N	Lithium nitride
Li-AB	Lithium amidoborane, Li-NH_2-BH_3
$LiBH_4$	Lithium borohydride
LIBS	Laser-induced breakdown spectroscopy
LiH	Lithium hydride
LLC	Limited Liability Company; Lessons Learned Corner
LLNL	Lawrence Livermore National Laboratory
L/min, l/min	Liter(s) per minute
LMWO	Lanthanum molybdenum tungsten oxide (*e.g.*, $La_2Mo_{1.8}W_{0.2}O_{9-x}$)
LN_2	Liquid nitrogen
LNG	Liquefied natural gas
LOC	Liquid organic carrier
LOHC	Liquid organic hydrogen carrier
LP	Lattice parameter
LPG	Liquefied petroleum gas
LPM	Liter(s) per minute
LPR	Liquid-phase reforming
LQ*	Dehydrogenated liquid carrier
LQ*H2	Hydrogenated liquid carrier
L-R	Longitudinal-radial
LRIP	Low rate initial production
LRS	Laser raman spectroscopy
LS	Local share
LSAC	Low-surface-area carbon
LSC	Lanthanum strontium cobalt oxide, (La, Sr)CoO_3, strontium-doped lanthanum cobaltite, $La_{0.8}Sr_{0.2}CoO_{3+\delta}$
LSCF	Lanthanum strontium cobalt iron oxide, (La, Sr)(Co, Fe)O_3
LSCF7328	La-Sr-Cu-Fe-O
LSCM	Lanthanum strontium chromium manganese oxide, (La, Sr)(Cr, Mn)O_3
LSCr	Lanthanum strontium chromium oxide, (La, Sr)CrO_3
LSF	Large station first
LSM	Lanthanum strontium manganese
LSMO	Lanthanum strontium manganese oxide, (La, Sr)MnO_3, strontium-doped lanthanum manganite, $La_{0.8}Sr_{0.2}MnO_{3+\delta}$
LST	Lanthanum strontium titanium oxide, (La, Sr)TiO_3
LSV	Lanthanum strontium vanadate; Linear sweep voltammetry
LT	Low-temperature
LTDMS	Laser induced thermal desorption mass spectrometry
LUMO	Lowest unoccupied molecular orbital
m	Meter(s)
M	Mole, Molar; Million
m^2	Square meter(s)
m^2/g	Square meter(s) per gram
m^2/s	Square meter(s) per second
m^3	Cubic meter(s)
MA	Mass activity; methyl acrylate
MA3T	Market Acceptance of Advanced Automotive Technologies
μA	Microampere(s)
mA	Milliamp(s)
MA	Mass activity
M-AB	Metal ammonia-borane
MAB, M-AB	Metal amidoboranes
$\mu A/cm^2$	Microampere(s) per square centimeter
mA/cm^2	Milliamp(s) per square centimeter
MARAD	Maritime Administration
MARKAL	Market Allocation Model—A generic, multi-sector energy model developed by the Energy Technology Systems Analysis Program of the International Energy Agency
MAS	Magic angle spinning
MASC	Multi-acid side chain
MAS ^{11}B-NMR	Magic angle spinning boron-11 nuclear magnetic resonance spectroscopy
MAS-NMR	Magic angle spinning nuclear magnetic resonance
MATI	Modular Adsorption Tank Insert
MAWP	Maximum allowable working pressure
MB	Megabyte
MBE	Molecular beam epitaxy
MBMS	Molecular beam mass spectrometry
M-BOP	Mechanical balance of plant
MBRC	Miles between roadcall

MBWR	Modified Benedict Webb Rubin
MC	Monte Carlo; Methyl cellulose
mC^2	Multi-component composite (membrane)
MCB	Marine Corps Base
$mC\text{-}cm^{-2}$	Millicoulomb(s) per square centimeter
MCEL	Millenium Cell, Inc.
MCFC	Molten carbonate fuel cell
mCHP	Micro-combined heat and power
µCHP	Micro-combined heat and power
µCHX	Microscale combustor/heat exchanger
MCM	Mobile crystalline material
µc-Si	Microcrystalline silicon
MDC	Material-dependent components
MDES	Methyl-diethoxy silane
mdip	5,5′-methylene-di-isophthalate
MDMC	Material Data Management Consortium
m-dobdc	4,6-DiOxido Benzene 1,3-DiCarboxylate
MEA	Membrane electrode assembly
MeAB	Methylamine borane
MEAM	Modified embedded atom method
MEC	Microbial electrolysis cell; Minimum explosive concentration
MeCN	Acetonitrile
MEIC	Mixed electronic and ionic conducting (membranes)
MEMS	Micro-electro-mechanical systems
MeOH	Methanol
meq	Milliequivalents
meq/g	Milliequivalents/gram
MES	Microstructered electrode scaffold
MeV	Mega electron volt
mf	Mass fraction
Mg	Megagram(s)
µg	Microgram(s)
mg	Milligram(s)
$MgCl_2$	Magnesium chloride
mg/cm^2	Milligram(s) per square centimeter
MgH_2	Magnesium hydride
MgH_2@C	MgH_2 incorporated in carbon scaffold
MgO	Magnesium oxide
$Mg(OH)_2$	Magnesium hydroxide
$mgPt/cm^2$	Milligram(s) of platinum per square centimeter
MH, M-H	Metal hydride
MHC	Metal hydride-based compressor
MHCoE	Metal Hydride Center of Excellence
MHE	Material handling equipment
MHI	Methylperhydroindole
MHz	Megahertz
mi	Mile(s)
MIE	Minimum ignition energy
MIEC	Mixed ionic and electronic conduction
mi/kg	Mile(s) per kilogram
mil	Millimeter(s)
Mim	Methyl imidazole
min	Minute(s)
MIP	Mercury intrusion porosimetry
MIT	Massachusetts Institute of Technology
MiTi®	Mohawk Innovative Technologies Inc.
MJ	Megajoule(s)
mL, ml	Milliliter(s)
ML	Monolayer
µCHP	Micro-combined heat and power
µm	Micrometer(s); micron(s)
µM	Micromolar
mM	Millimolar
mm	Millimeter(s)
MMBtu	Million British thermal units
MM-FSW	Multi-pass, multi-layer friction stir welding
MMOF	Microporous metal-organic framework
mmol	Millimole(s)
µmol	Micromole(s)
MMSCFD	Million standard cubic feet/day
MMT	Million metric tonnes
Mn	Manganese
Mn_2O_3	Manganese oxide
M-N-H	Amide/imide
MnO	Manganese oxide
$\mu\Omega\text{-}cm^2$	Micro-ohm(s)-square centimeter
Mo	Molybdenum
MO	Molecular orbital; metal oxide
MOA	Memorandum of Agreement
MOF	Metal-organic framework
mol	Mole(s)
MOL	Middle of life
mol%	Mole percent
mol/min	Mole(s) per minute
mΩ	Milli-ohm(s)
MΩ	Mega-ohm(s)
$m\Omega/cm^2$	Milli-ohm(s) per square centimeter

MoPc	Molybdenum phthalocyanine
MOR	Methanol oxidation reaction
MPa	Megapascal(s)
MPG, mpg	Mile(s) per gallon
MPGGE	Miles per gasoline gallon equivalent
mph	Mile(s) per hour
MPHI	Methylperhydroindole
MPL	Micro-porous layer
MPMC	Massively Parallel Monte Carlo
mpy	Miles per year
MQMAS	Multiple quantum magic angle spinning
MR	Membrane reactor
MRCAT	Materials Research Collaborative Access Team
MREC	Microbial reverse-electrodialysis electrolysis cell
MRI	Magnetic resonance imaging
MRL	Manufacturing readiness level
ms	Millisecond(s)
MS	Mass spectroscopy; Mass spectrometry; More Stations
MSAC	Mid-range carbon support; Medium surface area carbon
MSC	Moderate driver and short commute
mS/cm	Milli-Siemen(s) per centimeter
MS-H_2	Hydrogen mass spectrometry
MSM	Macro-System Model
MSR	Membrane steam reformer
MSRI	Materials and Systems Research, Inc.
MSRP	Manufacturer suggested retail price
MSTF	Mesostructured thin films
MTA	Metric tonne per annum; Mass Transportation Agency
MTBIO	Mean time between interrupted operation
MTBF	Mean time between failure
MTBR	Mean time between repairs
M/TC	Metal-doped templated carbon
M-TCPP	M = Fe, Mn, Co, Ni, Cu, Zn, H2, tetrakis(4-carboxyphenyl)porphyrin
mtorr	Millitorr
μV	Microvolt(s)
mV	Millivolt(s)
MV	Methyl viologen
mW	Milliwatt(s)
MW	Megawatt(s); Molecular weight
mW/cm^2	Milliwatt(s) per square centimeter
MWCNT	Multiple-wall carbon nanotube
MWe	Megawatt(s) electric
MWh	Megawatt-hour(s)
MWNT	Multi-wall carbon nanotube
MWOE	Midwest Optoelectronics, LLC
MWth	Megawatt(s) thermal
MYPP	Multi-Year Program Plan (the Fuel Cell Technologies Office's Multi-Year Research, Development, and Demonstration Plan)
MYRDD, MYRD&DP	Multi-Year Research, Development and Demonstration Plan
N	Normal (e.g., 1N H_3PO_4 is 1 normal solution of phosphoric acid); Nitrogen atom; Newton (unit of force)
N112	Nafion® 1100 equivalent weight, 2 millimeter thick membrane
N_2	Diatomic nitrogen
N_2O	Nitrous oxide
Na	Sodium
NA	North American
Na_2S	Sodium sulfide
Na_3AlH_6	Trisodium hexahydroaluminate
$NaAlH_4$	Sodium aluminum hydride; Sodium tetrahydroaluminate; Sodium alanate
$NaBH_4$	Sodium borohydride
$NaBO_2$	Sodium metaborate
NACE	National Association of Corrosion Engineers
NaCl	Sodium chloride
NACS	North American Catalysis Society
NADH	(reduced) Nicotinamide adenine dinucleotide
NADP	Nicotinamide adenine dinucleotide phosphate
NADPH	Nicotinamide adeninine dinucleotide phosphate
Nafion®	Registered Trademark of E.I. DuPont de Nemours
NaH	Sodium hydride
NA NG	North American natural gas
NaOH	Sodium hydroxide
NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration
Nb	Niobium
Ncc	Normal cubic centimeters
N/cm^2	Newton(s) per square centimeter
NCNR	NIST Center for Neutron Research
ND	Not determined at this time

NDC	New delivery concept, Naphthalene-2,6-dicarboxylate
nDDB	N-dodecyl benzene
NDE	Non-destructive examination
NE	U.S. DOE Office of Nuclear Energy, Science, and Technology
NEB	Nudged elastic band
NEC	National Electrical Code
NEF	N-ethylformamide
NEMA	National Electrical Manufacturers Association
NEMS	National Energy Modeling System
NEPA	National Environmental Policy Act
NETL	National Energy Technology Laboratory
NEU	Northeastern University
NEXAFS	Near edge X-ray absorption fine structure
NFCBP	National Fuel Cell Bus Program
NFCRC	National Fuel Cell Research Center
NFCTEC	National Fuel Cell Technology Evaluation Center
NFM	Nanoporous framework material
Nfn-Pt/C	Nafion®-loaded Pt/C
NFPA	National Fire Protection Association
ng	Nanogram
NG	Natural gas; Next generation
NGCC	Natural gas combined cycle
NGNP	Next Generation Nuclear Plant
NGV	Natural gas vehicle
NH_3	Ammonia
NHA	National Hydrogen Association
NHE	Normal hydrogen electrode
NHFC4	National Hydrogen and Fuel Cells Codes and Standards Coordinating Committee
NHI	Nuclear Hydrogen Initiative
NHTSA	National Highway Traffic Safety Administration of the U.S. Department of Transportation
Ni	Nickel
NICC	Natural gas Infrastructure Component Cost model
NILS	Normal interstitial lattice sites
NiMH	Nickel metal hydride
NIR	Near infra-red
NIST	National Institute of Standards and Technology
NL	Normal liter(s)
NLDFT	Non-local density functional theory
nm	Nanometer(s)
NM	Noble metal
Nm^3	Normal cubic meter(s)
NMHC	Non-methane hydrocarbons
NMOC	Non-methane organic carbons
nmol	Nanomole(s)
NMP	N-methylpyrrolidone
NMR	Nuclear magnetic resonance
NMSU	New Mexico State University
NMT	New Mexico Tech
NNA	Non-North American
NNA NG	Non-North American natural gas
NNIF	NIST neutron imaging facility
NNSA	National Nuclear Security Administration
NO_2	Nitric oxide
NOA	Norland Optical Adhesive
nOB	N-octyl benzene
NOx, NO_x	Oxides of nitrogen
NP	Nanoparticle
NPB	Neopentyl benzene
NPC	Nanoporous carbon; Normalized photocurrent
NPD	Neutron powder diffraction
NPDF	Neutron powder diffraction
NPGM	Non-precious metal group
NPM	Nanostructured polymeric materials; Non-precious metal
NPMC	Non-precious metal catalyst
NPPD	n-phenyl-phenylenediamine
NPS	National Park Service
NPT	Normal pressure and temperature
NPV	Net present value
NR	Nanorod
NR_3	Tertiary amine
NRC	National Research Council
NREL	National Renewable Energy Laboratory
NRELFAT	NREL Fleet Analysis Toolkit
NRVS	Nuclear resonance vibrational spectroscopy
NSF	National Science Foundation
NSTF	Nano-structured thin-film
NSTFC	Nano-structured thin film catalyst
NT	Nanotube
NTCNA	Nissan Technical Center, North America
NTE	Negative thermal-expansion
N-T-NT	Nano-grass type titania nanotube
NV	Neutron vibrational

NVS	Neutron vibrational spectroscopy
NW	Nanowire
NWM	Natural Water Management, UTC Power's system and cell stack design which utilizes evaprotative cooling in the cell stack assembly
NYSERDA	New York State Energy Research and Development Authority
NZVI	Nano zerovalent iron
Ω	Ohm(s)
Ωcm^2	Ohm(s)-square centimeter
O	Oxygen
O_2	Diatomic oxygen
O/C	Oxygen-to-carbon ratio
OCP	Open circuit potential
OCSD	Orange County Sanitation District
OCV	Open-circuit voltage
o.d.,OD	Outer diameter
ODA	Oxygenated form of diamine
ODE	Ordinary differential equation
OEC	Oxygen evolving complex
OEM	Original equipment manufacturer
OER	Oxygen evolution reaction
OGMC	Ordered graphitic mesoporous carbon
OH^-	Hydroxyl radical
O&M	Operation and maintenance
OMC	Ordered mesoporous carbon
Ω	Ohm(s)
Ωcm^2	Ohm(s)-square centimeter
ONR	Office of Naval Research
ORF	Opening Reading Frame indicating the occurrence of a protein coding region in the DNA sequence
ORNL	Oak Ridge National Laboratory
ORNL-HTML	Oak Ridge National Laboratory High Temperature Materials Laboratory
ORR	Oxygen reduction reaction
OSC	Oxygen storage capability
OSHA	Occupational Safety and Health Administration
OSM	Optical scatterfield microscopy
o-SWNH	Oxidized single-walled nanohorn
OSU	Ohio State University; Oregon State University (Microproducts Breakthrough Institute)
OTM	Oxygen transport membrane
P	Phosphorus; Pressure
Pa	Pascal(s)
PA	Phosphoric acid, Phenylacetylene; Polyamide
PAA	Poly(acrylic acid); polyphthalamide
P&D	Pickup and delivery
PAD	Polymer-assisted deposition
PADD	Petroleum Administration for Defense District
PAES	Poly(arylene-ether-sulfone)
PAFC	Phosphoric acid fuel cell
P&ID	Piping and instrumentation diagram
PAN	Peroxyacetyl nitrate; Polyacrylonitrile
PANI	Polyaniline
PAN-MA	Polyacrylonitrile with methyl acrylate
PAN-VA	Polyacrylonitrile with vinyl acetate
PA/PBI	Phosphoric-acid-doped polybenzimidazole
PAR	Photosynthetically-active radiation
PAS	Photoactive semiconductor; Photo acoustic
Pb	Lead
PB	Polyborazylene; Pre-bridge
PBCTF	Pressurized Button Cell Test Facility
PBD	Performance-based design
PBI	Polybenzimidazole
PBPDSA	poly(biphenylene disulfonic acid)
P-C	Pressure-composition
PC	Polycarbonate
PCA	Pyrenecarboxylic acid; Principal component analysis
PCE	Perchloroethylene
PCF	Polycarbonate film
PCHD	Poly(cyclohexadiene)
PCI	Pressure-composition isotherm
PCL	Polycaprolactone
PCM	Power control module
PCN	Porous coordination network
P-C-P	Phosphorus-carbon-phosphorus
PCR	Polymerase chain reaction
PCS	Power conditioning system
PCT, P-C-T	Pressure-concentration-temperature
PCTFE	Polychlorotrifluoroethylene
Pd	Palladium
PDA	Phenyldiacetylene
PdAg	Palladium-silver alloy
Pd-ACF	Pd-modified activated carbon fibers
Pd-CR	Palladium-based chemical resistor

PdCu, Pd-Cu	Palladium-copper alloy
PdCuTM	Palladium copper transition metal
PDF	Probability density function; Pair distribution function
PdHg/CF	Carbon foam doped with palladium-mercury compound
PDI	Polydispersity index
Pd-MIS	Palladium-based metal-insulator-semiconductor
PDMS	Polydimethylsiloxane
PDS	Potentiodynamic scan
PDU	Process development unit
PE	Polyelectrolyte; Polyethylene
PEC	Photoelectrochemical; Photoelectrocatalyst; Photoelectrochemical cell
PECH	Polyepichlorohydrin
PECVD	Plasma-enhanced chemical vapor deposition
PED	Pulsed electrodeposition
PEDOT:ClO_4	Poly(3,4-ethylenedioxythiophene):perchlorate
PEEK	Polyether ether ether ketone
PEFC	Polymer electrolyte fuel cell; Proton exchange fuel cell
PEG	Polyethylene glycol
PEGMEMA	Monomethoxypoly(ethyleneglycol) methacrylate
PEGS	Prototype electrostatic ground state
PEI	Polyetherimide; Polyethylene imine
PEKK	Poly (ether ketone ketone)
PEM	Proton exchange membrane; Polymer electrolyte membrane
PEMFC	Polymer electrolyte membrane fuel cell; Proton exchange membrane fuel cell
PEN	Polyethylene naphthalate
PEO	Poly(ethylene oxide)
PES	Polyether sulfone; Proton Energy Systems, Inc.; Polyethersulfone
PET	Polyethylene teraphthalate
PetF1	*Synechocystis* host ferredoxin
PEV	Plug-in electric vehicle
PF	Perfluoro
PFA	Perfluoroalkoxy (a type of fluoropolymer; Polyfurfuryl alcohol
PFAC	PFA-derived carbon
PFAE	Perfluoroalkylether
PFC	Polymer electrolyte membrane fuel cell
PFCS	Poly-generative fuel cell systems
PFD	Process flow diagram
PFGB	Perfluorinated guanidine base
PFG-NMR	Pulse field gradient nuclear magnetic resonance
PFGSE	Pulse field gradient spin echo
PFGSE NMR	Pulsed field gradient spin echo nuclear magnetic resonance
PFIA	Perfluoroimide acid
PFPO	Perfluorinated propylene oxide
PFPO-PSS	Poly(perfluoropropylene oxide)-b-poly(styrene sulfonate)
PFSA	Perfluorinated sulfonic acid, perfluorosulfonic acid, poly(fluorosulfonic acid)
PF-SFP	PF sulfonyl fluoride precursor
PFSI	Perfluorosulfonate ionomer
PFSHQ	2-(5-fluorosulfonyl-3-oxaoctafluoropentyl)-1,4-dihydroxy-benzene
PG	Propylene glycol
PGAA	Prompt-gamma activation analysis
PGE	Platinum group element
PGM	Precious group metal; Platinum-group metal
PGSE	Pulsed-field gradient spin-echo
PGV	Puna Geothermal Ventures
pH	Power of the hydronium ion
p-H_2	Para-hydrogen
Ph_3SnCl	Triphenyltin chloride
$Ph_3SnSnPh_3$	Hexaphenyldistannane
PHA	Process hazard analysis; Preliminary hazard analysis
PHEC	Perhydro-ethylcarbazole
PHEV	Plug-in hybrid electric vehicle
PHI	Perhydro-indolizidine
PHIP	Para-hydrogen induced polarization
PHMI	Perhydro-methylindole
PhOH	Phenol
PI	Principal investigator
PI	Polyimide
P&ID	Piping and instrumentation diagram; Process and instrumentation diagram
PIL, pIL	Protic ionic liquid
PIM, pIM	Protic ionic membrane
pK_a	Acid dissociation constant
PLC	Programmable logic controller
PLLA	Poly-L-lactic acid
PLP	Prepared Lewis pair
PLRS	Planar laser Raleigh scatter
PLS	Polymer-layered silicate

PM	Precious metal such as platinum; Particulate matter
PMG	Glycidyl methacrylate-type copolymer
PMMA	Poly(methyl methacrylate)
PND	Polymerized nitrogen donor
PNNL	Pacific Northwest National Laboratory
pO_2	Oxygen partial pressure
POC	Proof of concept
POCOP	*P,P-bis*(1,1-dimethylethyl)-,3-[[*bis*(1,1-dimethylethyl)phosphino]oxy]phenyl ester
POF	Polymeric-organic framework; Porous organic framework
POM	Polyoxometallate
POP	Porous organic polymers
POSS	Polyhedral oligomeric silsesquioxane
POX	Partial oxidation
PP	Polyphosphazene; Polypropylene; Poly(phenylene)
PPA	Polyphosphoric acid; Polyphthalamide
ppb	Part(s) per billion
ppbv	Part(s) per billion by volume
PPDSA	Poly (p-phenylene disulfonic acid)
PPE	Porous polyethylene
PPI	Plug Power, Inc.; Pore(s) per inch
ppm, PPM	Part(s) per million
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
P-POSS	Phosphonic acid polyhedral oligomeric silsesquioxane
PPS	Polyphenylene sulfide
PPSA	Poly (p-phenylene sulfonic acid)
PPSA	Partial pressure swing adsorption
PPSU	Polyphenylsulfone
PPy	Polypyrrole
Pr	Praseodymium
PR	Pressure ratio
PRA	Probabilistic risk assessment
PRD	Pressure relief device
PrOx	Preferential oxidation
PRSV	Peng-Robinson Stryjek-Vera
PS	Proton sponge (bis- (dimethyamino) naphthalene); Polysiloxane
PSA	Pressure swing adsorption, adsorber
PSAT	Powertrain Systems Analysis Toolkit, a vehicle simulation software package developed at Argonne National Laboratory
PSD	Particle size distribution, pore size distribution
PSEPVE	Perfluoro (4-methyl-3,6-dioxaoct-7-ene) sulfonyl fluoride
PSf	Poly(arylene ether sulfone)
psi, PSI	Pound(s) per square inch
PSI	Photosystem I
PSII	Photosystem II
psia	Pound(s) per square inch absolute
psid	Pound(s) per square inch differential
psig, PSIG	Pound(s) per square inch gauge
PSOFC	Planar solid oxide fuel cell
PSS	Porous stainless steel; Potentiostatic scan
PSU	Polysulfone
PSU	Pennsylvania State University
Pt	Platinum
PT	Phosphazene trimer
P-T	Pressure-temperature
Pt_3Co	Platinum-cobalt alloy
Pt_3Fe	Platinum-iron alloy
Pt_3Ni	Platinum-nickel alloy
PTA	Phosphotungstic acid
Pt/AC/BC/IRMOF-8	Isoreticular metal organic framework (MOF) doped with platinum supported on activated carbon, and further coupled to MOF with a bridging compound
Pt/AX-21	Pt-doped microporous carbon AX-21
Pt/C	Platinum/carbon
PTC	Production tax credit
PTFE	Teflon® – poly-tetrafluoroethylene
Pt-FePO	Platinum iron phosphate
PTM	Proton transport membrane
PtML	Platinum monolayer
Pt-MM	Platinum group mixed metal
Pt-NH	Platinum decorated carbon nano-horns
PtO	Platinum oxide
PtO_2	Platinum dioxide
PtRu	Platinum ruthenium
Pt-SWNH	Platinum decorated single-walled nanohorns
Pt-TaPO	Platinum tantalum phosphate
PTTPP	Poly-tetrakis(3,5-dithiophen-2-ylphenyl)-porphyrin
PTW	Pump to wheels

PV	Photovoltaic; Present value
PVA	Polyvinyl alcohol
PVC	Polyvinyl chloride
PVD	Physical vapor deposition
PVDC	Polyvinylidene chloride
PVDF	Polyvinylidene fluoride
PVP	Polyvinylpyrrolidone
PVPP	Polyvinyl pyridinium phosphate
PVT, P-V-T	Pressure-Volume-Temperature
PXRD	Powder X-ray diffraction
PyC	4-pyrazole carboxylate
PzDC	2,8-pyrazabole dicarboxylate
Q	Neutron momentum transfer
Q1, Q2, Q3, Q4	Quarters of the year
QC	Quality control
QCM	Quartz crystal microbalance
QE	Quantum efficiency
QENS	Quasielastic neutron scattering
QLRA	Qualitative risk analysis
QMC	Quantum Monte Carlo
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
RAS	Russian Academy of Sciences
RBS	Rutherford back scattering
RC	Resistance-capacitance; Research cluster
RCD	Rated current density
RCS	Regulations codes and standards
RCSWG	Regulations, Codes, and Standards Working Group
Rct	Charge transfer resistance
RCWA	Rigorous couples waveguide analysis
R&D	Research and development
RD&D, R,D&D	Research, development & demonstration
RDE	Rotating disk electrode
Re	Rhenium
ReaxFF	Reactive force field large-scale molecular dynamic calculations
REC	Renewable energy credit
RED	Reverse electrodialysis
REWP	Renewable Energy Working Party
Rf	Generic fluoroalkyl group
RF, rf	Radio frequency
RFC	Regenerative fuel cell
RFI	Request for Information
RFP	Request for proposals
RFT	Reactive flow-through
RGA	Residual gas analyzer (analysis)
Rh	Rhodium
RH	Relative humidity
RHE	Reference hydrogen electrode; Reversible hydrogen electrode
RHLC	Relative humidity/load cycle test
ρ_a	Apparent density of activated carbon
$\rho_{ad.H_2}$	Adsorbate hydrogen density in micropores
RIF	Reactive impinging flow
RIXS	Resonant inelastic X-ray scattering spectra
RMS	Root mean square
RNA	Ribo nucleic acid
RNG	Renewable natural gas
ROI	Return on investment
ROM	Rough order of magnitude
ROMP	Ring-opening metathesis polymerization
ROW	Right of way
RPC	Ruthenium-polypridyl complex
RPI	Rensselaer Polytechnic Institute
rpm	Revolution(s) per minute
RPN	Risk priority number
RPS	Renewable portfolio standard
RPSA	Rapic pressure swing adsorption
RR	Round robin
RRDE	Rotating ring disc electrode
RSOFC	Reversible solid oxide fuel cell
RT	Room temperature
RTD	Resistive temperature device
RTIL	Room temperature ionic liquid
RTO	Ruthenium-titanium oxide
Ru	Ruthenium
s	Second(s)
S	Siemen(s); Sulfur
-S	Sulfur-deprived
SA	Specific amperage; Surface area; Sulfur-ammonia thermochemical water-splitting cycle; System Architect

SAC	Super-activated carbon
SAE	SAE International, originally known as the Society of Automotive Engineers
SAFC	Solid acid fuel cell
SAH	Sodium aluminum hydride
SAM	Scanning Auger microscopy
SAMPE	Society for the Advancement of Material and Process Engineering
SANS	Small angle neutron scattering
SAS	Styrene-acrylonitrile-vinylsulfate
SASSP	Solvent assisted solid state processing
SAXS	Small angle X-ray scattering
SBAB	Sec-butylamineborane
S_{BET}	BET specific surface area
SBH	Sodium borohydride
SBIR	Small Business Innovation Research
Sc	Scandium
S/C	Steam to carbon ratio
SCC	Stress corrosion cracking
sccm, SCCM	Standard cubic centimeter(s) per minute
SCCV	Steel/concrete composite vessel
SCE	Saturated calomel electrode
SCF, scf	Standard cubic feet; Supercritical fluid
scfd	Standard cubic feet per day
SCFH, scfh	Standard cubic feet per hour
SCFM	Standard cubic feet per minute
S/cm	Siemen(s) per centimeter
SCOF	Single cell with open flowfield
SCR	Selective catalytic reduction; Semi-conductor rectifier
ScSZ	Scandia-stabilized zirconia
SD	Standard deviation; System dynamics
SDAPP	Sulfonated Diels-Alder polyphenylene
SDAPPe	Sulfonated Diels-Alder polyphenylene ether
SDC	Samarium-doped ceria
sDCDPS	3,3′-disulfonate-4,4′-dichlorodiphenylsulfone
SDE	SO_2-depolarized electrolyzer
SDO	Standards development organization
Se	Selenium
SE	Secondary electron; spectroscopic ellipsometry
sec	Second(s)
SECA	Solid State Energy Conversion Alliance
SECM	Scanning electrochemical microscope
SEM	Scanning electron microscopy; Scanning electron microscope
SEOS	Simple equation of state
SERA	Scenario Evaluation, Regionalization, and Analysis
SERC	Schatz Energy Research Center
SET	Surface energy treatment
SF	Safety factor; Polystyrene-b-PFPO
SF_6	Sulfur hexafluoride
SFA	Sulfonic acid
SFC2	$SrFeCo_{0.5}O_x$
SFM	$Sr_2Fe_{1.5}Mo_{0.5}O_{6-\delta}$
SFT	Sr-Fe-Ti oxide
SFTI	$Sr_{0.1}Fe_{0.9}Ti_{0.10}O_x$
SG	Shale gas
SGD	Spontaneous galvanic displacement; System gravimetric density
SGIP	Self-Generation Incentive Program
Sh	Sherwood
SHE	Standard hydrogen electrode
Si	Silicon
S-I	Sulfur-iodine
SI	Sulfur-iodine cycle; Spectrum image
Si^3N^4	Silicon nitride
SiC	Silicon carbide
SiCN	Silicon carbonitride
SIMS	Secondary ion emission spectroscopy
Si-NS	Silica nanosprings
SiO_2	Silicon dioxide
SIU	Southern Illinois University
sL	Standard liter (0°C, 1 atm)
SLAC	Stanford Linear Accelerator Center
SLMA	Sr- and Mn-doped $LaAlO_3$
SLMA2	$Sr_xLa_{1-x}Mn_yAl_{1-y}O_3$ perovskite compositions
SLPH	Standard liter(s) per hour
SLPM	Standars liter(s) per minute
slpm, slm, sL/min	Standard liter(s) per minute
SLT	Strontium-doped lanthanum titanate
SMART	Specific, measurable, attainable, relevant, timely
SMR	Steam methane reformer; Steam methane reforming
SMR-ECM	Steam methane reformer with electrochemical purifier
SMR-PSA	Steam methane reformer with pressure swing adsorption
SMT	Single-molecule trap

Sn	Tin
SNF	Silica nanofiber
SNG	Substitute natural gas
SNL	Sandia National Laboratories
SNLL	Sandia National Laboratory Livermore
SnO	Tin oxide
SnO_2	Tin dioxide
SNR	Signal-to-noise ratio
SNS	Spallation neutron source
SNTT	Spiral notch torsion test
SO_2	Sulfur dioxide
SO_3	Sulfur trioxide
SOC	State-of-charge
SOEC	Solid oxide electrolysis cell; Solid oxide electrolyzer cell
SOFC	Solid oxide fuel cell
SOFEC	Solid oxide fuel-assisted electrolysis cell
SOM	Solid-oxide oxygen-ion-conducting membrane
SORFC	Solid oxide regenerative fuel cell
SOTA	State of the art
SOW	Statement of work
SOx	Oxides of sulfur
sPAES	Sulfonated poly(arylene ether sulfone)
SPE	Solid phase epitaxial
SPEEK	Sulfonated poly(ether ether ketone)
SPEK	Sulfonated poly-etherketone-ketone
SPEKK	Sulfonated polyether(ether ketone ketone)
SPEX	Type of milling machine
SPM	Scanning probe microscope
sPOSS	Sulfonated octaphenyl polyhedral oligomeric silsesquioxanes
S-PPSU	Sulfonated polyphenylsulfone
SPS	Spark plasma sintering
sq. in.	Square inch(es)
Sr	Strontium
SR	Steam reformer; Steam reforming; Salinity ratio; Stoichometric ratio
SRNL	Savannah River National Laboratory
SrO	Strontium oxide
SRR	Solar receiver-reactor
$SrTiO_3$	Strontium titanate
SS	Stainless steel
SSA	Specific surface area
SSAWG	Storage System Analysis Working Group
SSC	Short side-chain; Structure, system, and component
SSF	Small station first
SSM	Sacrificial support method
SSNMR	Solid-state nuclear magnetic resonance
SSRL	Stanford Synchrotron Radiation Laboratory
SSWAG	Storage System Working Analysis Group
STCH	Solar thermochemical hydrogen
STEM	Scanning transmission electron microscopy
STH	Solar to hydrogen
STM	Scanning tunneling microscopy
STMBMS	Simultaneous thermogravimetric modulated beam mass spectrometer
STP	Standard temperature and pressure
STS	Scanning tunneling spectroscopy
STTP	Shared Technology Transfer Project
STTR	Small Business Technology Transfer
S_u	Ultimate tensile strength
SU/SD	Start-up/shut-down
SUNY-ESF	State University New York College of Environmental Science and Forestry
SV	Space velocity; surface validation
SVD	System volumetric density
SW	Square wave
SWCNH	Single-wall carbon nanohorn
SWCNT	Single-walled carbon nanotube
SWNH	Single-walled nanohorn
SWNT	Single-wall nanotube
SwRI®	Southwest Research Institute®
S_y	Yield strength
SUV	Sport utility vehicle
SYT	Yttrium-doped strontium titanate
T	Temperature
T, t	Ton, tonne
T	Tesla (unit of magnetic induction)
t	Time
T_{1bar}	Temperature at which equilibrium pressure of hydrogen is 1 bar for a hydrogen exchange reaction
Ta	Tantalum
TA	Terephthalic acid
TAG	Technical Advisory Group
TAMU	Texas A&M University
TaON	Tantalum oxynitride
TaPO	Tantalum phosphate
TBAB	Tetra-n-butylammonium bromide

$TBA_2B_{12}H_{12}$	Tetra-*n*-butylammonium dodecahydrododecaborate
TBABh	Tetra-n-butylammonium borohydride
TBA-PF_6	Tetra-*n*-butylammonium hexafluorophosphate
TBD	To be determined
TBMD	Tight-binding molecular dynamic
TC	Templated carbon; Thermocouple
TCCR	Transparent, conducting and corrosion resistant
TCD	Thermal conductivity detector
TCNE	Tetracyanoethylene
TCO	Transparent conductive oxide; Total cost of ownership
TDDFT	Time-dependent density functional theory
TDLAS	Tunable diode laser absorption spectroscopy
TDPAT	2,4,6-tris(3,5-dicarboxylphenylamino)-1,3,5-triazine
TDS	Transitional demand scenario
Te	Tellurium
te	Metric ton or tonne (1,000 kg)
TEA	Triethylamine
$TEA_2B_{12}H_{12}$	Triethylammonium dodecahydrododecaborate
TEAA	Triethylamine alane adduct
TEAB	Tetraethyl ammonium borohydride
TEAH	Tetraethylammonium hydroxide
TEAMS	tetraethylammonium methane sulfonic
TED	Triethylene-diamine
TEDA	Triethylenediamine
TEM	Transmission electron microscopy
TEOA	Triethanolamine
TEOM	Tapered element oscillating microbalance
TEOS	Tetra-ethoxy silane
tf	Thin film
Tf	Trifluormethane sufonate, or triflate anion (CF_3SO_3-)
TFA	Trifluoromethanesulfonic acid
TFAc	Trifluoroacetate
TFE	Tetrafluoroethylene
TFMPA	Trifluoromethylphosphonic acid
TFMSA	Trifluoromethane sulfonic acid
TF-RDE	Thin film rotating disk electrode
tf-Si	Thin-film silicon
TFSI	bis(Trifluoromethylsulfonyl)imide
TFVE	Trifluorovinyl ether
Tg, T_g	Glass transition temperature
TG	Thermogravimetric; Theory Group
TGA	Thermal gravimetric analysis; Thermogravimetric analysis; Thermogravimetric analyzer
TGA-DSC	Thermo-gravimetric analysis-differential scanning calorimetry
TGA-MS	Thermogravimetric analysis-mass spectrometer
TG-DTA	Thermo-gravimetric/differential thermal analyzer
THF	Tetrahydrofuran
Ti	Titanium
$TiCl_3$	Titanium trichloride
TiF_3	Titanium trifluoride
TiH_2	Titanium hydride
Ti-IRMOF-16	Titanium (Ti) intercalated IRMOF-16
TiO_2	Titanium dioxide (anatase)
Tip	2,4,6-triisopropylphenyl
TIVM	Toroidal intersecting vane machine
TKK	Tanaka Kikinzoku Kogyo K. K.
TLA, *Tla*	Truncated light-harvesting chlorophyll antenna
tla1	Mutant of the Tla1 gene (GenBank Assession No. AF534570)
tlaR	Mutant of unknown gene with a truncated light-harvesting chlorophyll antenna
tlaX	Mutant of unknown gene with a truncated light-harvesting chlorophyll antenna
TLCP	Thermotropic liquid crystal polymer
TM	Tetramethyl bisphenol A; Transition metal
TMA	Trimethylamine; Trimethylaluminum; Thermal mechanical analyzer
TMAA	Trimethylamine alane adduct
TMAB	Tetramethylammonium borohydride
TMAH	Tetramethylammonium hydroxide
TMB	Trimethylborate
TMEDA	Tetramethylethane-1,2-diamine; N^1,N^1,N^2,N^2-tetramethylethane-1,2-diamine
TMG	Tetramethyl guanidine
TM-N-C	Transition metal-doped nitrogen-carbon
TMOS	Tetramethoxy silane
TMPP	Tetramethoxyphenyl porphyrins
TMPS	Trimethoxyl phenyl silane
TMPyP	Tetramethylpyridylporphine
TNA	Titania nanotube array
TNT	Trinitrotoluene
TN-T	TiO_2 nanotubes
TOC	Total organic content

TOF	Turnover frequency
ToF-SIMS	Time-of-flight secondary ion spectroscopy
TPA	Tripropylamine; Temperature-programmed adsorption
TPAH	Tetra-n-propylammonium hydroxide
TPB	Triple phase boundary
TPD	Tonne(s) per day; tons/day
TPD	Thermally programmed desorption; Temperature-programmed desorption
TPDMS	Temperature-programmed desorption mass spectrometry
TPO	Temperature-programmed oxidation
TPP	Tetraphenyl porphyrin
TPPS	5,10,15,20-tetrakis(4-sulfonatophenyl) porphyrin
TPR	Temperature-programmed reduction
TPRD	Thermally-activated pressure relief device
TPS	3-(trihydroxysilyl)-1-propane-sulfonic acid
TPV	Through-plate voltage
TRA	Technology Readiness Assessment
TRAIN	TrainingFinder Realtime Affiliate Network
Tri-Gen	Tri-generation
TRL	Technology readiness level
TRO	RuO_2-TiO_2
Trityl	Chemical blocking group used to protect amines
tr. oz.	Troy ounce
TRU	Transport refrigeration units
TSWS	Temperature-swing water splitting
TVS	Twin Vortices Series
TW	Triangel wave
UC	University of California
UCB	University of California, Berkeley
UCF	University of Central Florida
UCI	University of California, Irvine
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
UFL	Upper flammability limit
UGA	University of Georgia, Athens
UH	University of Hawaii
UHP	Ultra-high purity
UHV	Ultra-high vacuum
UIUC	University of Illinois, Urbana-Champaign
UL	Underwriters Laboratory
ULAM	Ultra-low-angle microtomy
ULSD	Ultra-low sulfur diesel
UM	University of Michigan
UMC	Unsaturated metal centers
UMC	Ultramicroporous carbon
UMCP	University of Maryland, College Park
UMSL	University of Missouri, St. Louis
UN	United Nations
UNB	University of New Brunswick
UNCC	University of North Carolina at Charlotte
UNECE	United Nations Economic Commission for Europe
UNLV	University of Nevada, Las Vegas
UNLVRF	UNLV Research Foundation
UNM	University of New Mexico
UNR	University of Nevada, Reno
UPD	Underpotential deposition
UP-DW	Ultra-pure distilled water
UPE	Ultra-high molecular weight polyethylene
UPL	Upper potential limit
UPS	Ultraviolet photoelectron spectroscopy
U.S.	United States
US06	Environmental Protection Agency vehicle driving cycle
USA	United States of America
USANS	Ultra-small angle neutron scattering
USAXS	Ultra-small angle X-ray scattering
USB	Universal serial bus
USC	University of South Carolina; University of Southern California
USCAR	United States Council for Automotive Research, U.S. Cooperative Automotive Research
USCG	United States Coast Guard
U.S. DRIVE	United States Driving Research and Innovation for Vehicle efficiency and Energy sustainability
USFCC	United States Fuel Cell Council
USM	University of Southern Mississippi
USTAG	U.S. Technical Advisory Group
UT	University of Toledo; University of Tennessee
UTC, UTC FC	United Technologies Corporation Fuel Cells
UTC	University of Tennessee, Chattanooga
UTCP	UTC Power
UTRC	United Technologies Research Center

UTS	Ultimate tensile strength
UV	Ultraviolet
UVL	Upper voltage limit
UV-vis	Ultraviolet-visual
UW	University of Washington
V	Vanadium; Volt
VA	Vinyl acetate
VAC	Volts alternating current
VACNTs	Vertically aligned carbon nanotubes
VANTA	Vertically aligned nanotube arrays
VASP	Vienna ab initio simulation package
VaTech	Virginia Polytechnic Institute and State University
VB	Valence band
VBM	Valence band minimum, Valence band maximum
VC	Vanadium carbide; Vulcan carbon; Volumetric capacity
VDC	Volts direct current
VDF	Vinylidene fluoride
VDOS	Vibrational density of states
vdW	van der Waals
vdW-DF	van der Waals density function
VFA	Volatile fatty acid
VFS	Vehicle fueling station
$V(H_2)$	Volumetric hydrogen adsorption capacity; Volumetric hydrogen storage capacity
VHSV	Volumetric hourly space velocity
VHTR	Very high temperature gas-cooled nuclear reactor
VHTS	Virtual high-throughput screening
VI	Venter Institute
V-I, V/I	Voltage–current
VIM/VAR	Vacuum induction melting/vacuum arc remelting
VIR	Voltage-current-resistance
VIS	Visible light at 400-700 nm
V_{mp}	Micropore volume
VMT	Vehicle miles traveled
VOC	Volatile organic compound, Voltage open circuit
Vol., vol.	Volume
vol%	Volume percent
V_{pore}	Total pore volume
VT	Virginia Tech
W	Tungsten; Watt(s)
WAXD	Wide-angle X-ray diffraction
WAXS	Wide angle X-ray scattering
WBS	Work breakdown schedule
WC	Tungsten carbon; Tungsten carbide
W/cm^2	Watt(s) per square centimeter
WDD	Water displacement desorption
We, W_e	Watt(s) electric
WG	Working group
WG-12	Working Group 12
WGS	Water-gas shift
WGSMR	Water-gas shift membrane reactor
WGSR	Water-gas shift reactor
Wh	Watt-hour(s)
$W(H_2)$	Gravimetric hydrogen storage capacity
W-h/kg	Watt-hour(s) per kilogram
W-h/L, Wh/liter, Wh/L	Watt-hour(s) per liter
WHSV	Weight hourly space velocity
Wind2H2	Wind to hydrogen demonstration project
W/kg	Watt(s) per kilogram
W/L, W/l	Watt(s) per liter
W/m-K, W/m.K, W/mK	Watt(s) per meter-Kelvin (unit of thermal conductivity)
WMO	World Meteorological Organization
WO_3	Tungsten trioxide
WO_x	Tungsten oxide
WP.29	Working Party 29 - World Forum for Harmonization of Vehicle Regulations
Wppm	Weight part(s) per million
WS	Water splitting
WSTF	White Sands Test Facility
wt	Weight
Wt	Watt(s) thermal
wt%, wt.%	Weight percent (percent by weight)
WT	Wild type
WTP	Well to pump; Water transport plate
WTPP	Well-to-power plant
WTT	Well-to-tank
WTW	Well-to-wheels
w/v	Weight by volume
WWTP	Waste water treatment plant
X-	an anionic ligand such as chloride
XAFS	X-ray absorption fine structure
XANES	X-ray absorption near-edge spectroscopy
XAS	X-ray absorption spectroscopy

XC72	High-surface-area carbon support made by Cabot
XES	X-ray emission spectroscopy
X_{O2}	Oxygen mole fraction
XPS	X-ray photoelectron spectroscopy, X-ray photon spectroscopy, X-ray photoemission spectroscopy, X-ray photoluminescence spectroscopy
XPS-UPS	X-ray photoelectron-ultraviolet photoelectron spectroscopy
XRD	X-ray diffraction
XRF	X-ray fluorescence
XRT	X-ray tomography
Y	Yttrium
YB	Young Brothers, Ltd.
yr, YR	Year
YSZ	Yttria-stablized zirconia
Z	Atomic number
ZEBA	Zero Emission Bay Area
ZEV	Zero emission vehicle
ZHS	Zinc hydroxystannate
ZIF	Zeolitic imidazolate framework
ZIO	Zirconium-doped indium oxide
ZMOF	Zeolite(-type) metal-organic framework
Zn	Zinc
ZnO	Zinc oxide
ZPE	Zero point energy
zpp	Zirconium phenyl phosphonate
Zr	Zirconium
ZrO_2	Zirconium dioxide
ZrSPP	Zirconium phosphate sulfophenylphosphonate
ZVI	Zerovalent iron