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LIST OF ABBREVIATIONS

Alphabetic symbols: Meaning

A	Parameter related to ethanol concentration
a	lattice parameter
B	Parameter related to Anode electrocatalyst loading
C	Parameter related to cell temperature
C_{PAB}	Pristine acetylene black
C_{AB}	Functionalized acetylene black
c_p	Central points
d_c	average crystallite size
d_{hkl}	interplanar distance between two planes of Miller index (hkl)
d_p	average particle size
2FI	Two factor interaction
FAM	Formic acid reduction method
k	number of factors studied in the experiment
N	Total number of experiments to be performed
n	total number of counted electrocatalyst nanoparticles
PLM	Polyol reduction method
p-value	Probability value
p-MWCNT	Pristine Multi-walled carbon nanotubes
f-MWCNT	Functionalized Multi-walled carbon nanotubes
R^2	Coefficient of determination
S_{BET}	Specific surface area calculated by multi-points Brunauer-Emmet-Teller method, m^2/g
X_i and X_j	Independent variables for the studied factor
Y	Predicted response

Abbreviations: Meaning

AFC	Alkaline Fuel Cell
ANOVA	Analysis of variance
BBD	Box-Behnken Design

CA	Chronoamperometry
CCD	Central composite design
CNTs	Carbon nanotubes
CCM	Catalyst-coated membrane
CV	Cyclic Voltammetry
3D	Three-dimensional
2D	Two-dimensional
DEFC	Direct Ethanol Fuel Cell
DEMS	Differential electrochemical mass spectrometry
DF	Degree of freedom
ECSA	Electrochemically active surface area
EDX	Energy dispersive X-ray spectroscopy
EOR	Ethanol Oxidation Reaction
FESEM	Field Emission Scanning Electron Microscopy
FLG	Few layered graphene
FTIR	Fourier Transformed Infrared Spectroscopy
FWHM	Full width at half maximum
GC	Gas chromatography
GDL	Gas Diffusion Layer
HPLC	High Performance Liquid Chromatography
MEA	Membrane Electrode Assembly
MWCNTs	Multi-walled carbon nanotubes
MCFC	Molten Carbonate Fuel Cell
NPs	Nanoparticles
OCV	Open circuit voltage
ORR	Oxygen Reduction Reaction
PEM	Proton exchange membrane
PEMFC	Proton Exchange Membrane Fuel Cell
PAFC	Phosphoric Acid Fuel Cell
PTFE	Polytetrafluoroethylene
PRESS	Predicted residual error sum of squares
RSM	Response surface methodology
SOFC	Solid Oxide Fuel Cell

SEM	Scanning Electron Microscope
SWNTs	Single-walled carbon nanotubes
TEM	Transmission Electron Microscopy
XRD	X-Ray Diffraction
XPS	X-ray photoelectron spectroscopy

Greek Symbols: Meaning

α_o	Model intercept coefficient
α_i	Linear effect regression coefficients
α_{ii}	Quadratic effect regression coefficients
α_{ij}	Interaction effect regression coefficients
μ	Micro
β	width of the peak (in radians) at its half-height
κ	Scherrer constant (0.90 for spherical crystallite)
λ	X-ray wavelength used (1.54056 Å for Cu-K $_{\alpha 1}$ radiation)