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List of Abbreviations

Abbreviation	Meaning
1-D	One dimensional
ABSA	Alkylbenzenesulfonic acids
APL	Antibonding polaron level
APS	Ammonium peroxydisulfate
BB	Bethe-Bloch
BJT	Bipolar junction transistors
BNN	Barton-Nakajima-Namikawa
BPL	Bonding polaron level
CBH	Correlated barrier hopping
CC	Cole-Cole
CCD	Charge-coupled device
cm	Centimetre
CMC	Critical micelle concentration
CSA	Camphorsulfonic acid
DBSA	Dodecylbenzenesulfonic acid
DC	Davison-Cole
DeTAB	Decyltrimethylammonium bromide
DTAB	Dodecyltrimethyl ammmonium bromide
EMI	Electromagnetic interference
eV	Electron volt
FD	Frequency-domain
FET	Field effect transistor
FTIR	Fourier transform infrared spectroscopy
FWHM	Full width at half maximum
HEDS	High energy dead section
HN	Havriliak-Nigami
HOMO	Highest occupied molecular orbital
HRTEM	High resolution transmission electron microscopy

Abbreviation	Meaning
Hz	Hertz
ICP	Intrinsically conducting polymers
ITO	Indium-tin oxide
IUAC	Inter University Accelerator Centre
KeV	Kilo electron volt
KPS	Potassium persulfate
KWW	Kohlrausch-Williams-Watts
LEDS	Low energy dead section
LSS	Lindhard-Scharff-Schiøtt
LUMO	Lowest unoccupied molecular orbital
MHz	Mega Hertz
MIS	Metal/insulator/semiconductor
MISFET	Metal-insulator-semiconductor field effect transistor
MO	Methyl orange
MS	Materials Science
MWS	Maxwell-Wagner-Sillars
NIR	Near infrared
NSPT	Non-overlapping small polarons tunnelling
OBSA	Octylbenzenesulfonic acid
OFET	Organic field-effect transistor
OLPT	Overlapping large polaron tunnelling
OTAB	Octyltrimethylammonium bromide
PA	Polyacetylene
PAni	Polyaniline
PC	Polycarbonate
PEDOT	Poly (3,4-ethylenedioxythiophene)
PPV	Poly(phenylene vinylene)
PPy	Polypyrrole
PTh	Polythiophene
p-TSA	para-Tolunesulfonic acid
PVA	Poly-vinyl alcohol

Abbreviation	Meaning
QMT	Quantum mechanical tunnelling
SDS	Sodium dodecylsulfate
SHI	Swift heavy ion
SNICS	Source of negative ions by cesium sputtering
SRIM	Stopping ranges of Ions in matter
TD	Time-domain
TGA	Thermo-gravimetric Analysis
UV-vis	UV-visible spectroscopy
XRD	X-ray diffraction

List of Symbols

Symbols	Meanings
e	Electronic charge
$\sigma'(\omega)$	Total electrical conductivity
σ_{dc}	DC conductivity
σ_{ac}	AC conductivity
s	Frequency exponent
ω	Angular frequency
$N(E_F)$	Density of states at Fermi level
R_ω	Hopping distance at a particular frequency
τ_0	Relaxation time
ε_p	Effective dielectric constant
α	Exponential decay parameter
r_p	Polaron radius
ε_0	Dielectric permittivity at free space
k_B	Boltzman constant
T	Temperature
f_0	Relaxation frequency
G	Conductance
C	Capacitance
ε^*	Complex permittivity
ε'	Real part of permittivity
ε''	Imaginary part of permittivity
ε_s	Static dielectric permittivity in the limit of zero frequencies
ε_∞	Permittivity in the limit of infinite frequencies
$\Delta\varepsilon$	Dielectric relaxation strength
α	Symmetrical distribution of relaxation times
β	Asymmetric distribution of relaxation times
M^*	Complex modulus
M'	Real part of modulus

Symbols	Meanings
M''	Imaginary part of modulus
$\phi(t)$	Kohlrausch-Williams-Watts (KWW) decay function
Z^*	Complex impedance
Z'	Real part of impedance
Z''	Imaginary part of impedance
N_0	Avogadro's number
a_o	Bohr radius
v_o	Bohr velocity
S_n	Nuclear energy loss
S_e	Electronic energy loss
ρ	Density
φ	Fluence
Q	Total charge
D	Dose
q	Charge state
X_C	Degree of crystallinity
L	Extent of polymer chain order
R	Interchain separation or hopping distance
E_g	Optical band gap energy
τ_{0M}	High temperature limit of relaxation time
E_{aM}	Activation energy for relaxation of charge carriers
σ	Formation (or damage) cross section
E_a	Hopping activation energy
W_H	Barrier activation energy