

LIST OF ABBREVIATION AND SYMBOLS

%	percentage
°C	degree centigrade
0-D	zero dimensional
1-D	one dimensional
2-D	two dimensional
3-D	three dimensional
AC	alternating current
APTES	(3-Aminopropyl)triethoxysilane
ASTM	American society for testing and materials
ATR	attenuated total reflection
BD	1,4-butanediol
BET	Brunauer-Emmett-Teller
BJH	Barrett-Joyner-Halenda
BLPU	bio-based linear polyurethane
BPA	bisphenol-A
BTI	bitolylene diisocyanate
ca.	circa
CB	conduction band
CBED	convergent beam electron diffraction
CD	carbon dot(s)
cm	centimeter(s)
CNC	cellulose nanocrystal(s)
CNT	carbon nanotube(s)
CO	castor oil
COMP	castor oil modified polyol
CQD	carbon quantum dot(s)
DABCO	1,4-Diazabicyclo[2.2.2.]octane
DB	degree of branching
DBTDL	dibutyltin dilaurate
DBTDA	dibutyltin diacetate
DBU	1,8-Diazabicyclo[5.4.0]unde-7-ene
DDI	dimer acid diisocyanate
DEA	diethanolamine

DGEBA	diglycedylether epoxy of bisphenol A
DMAc	dimethylacetamide
DMSO	dimethyl sulfoxide
DMF	dimethylformamide
DPP	diphenyl phosphate
DSC	differential scanning calorimetry
e ⁻	electron(s)
<i>E. Coli</i>	<i>Escherichia coli</i>
EIS	electrochemical impedance spectroscopy
EtOH	ethanol
eV	electron volt
fcc	face centered cubic
FFT	fast Fourier transform
FTIR	Fourier transform infrared
g	gram(s)
GC	gas chromatography
g-CN	graphitic-carbon nitride
g mol ⁻¹	gram per mole(s)
GPC	gel permeation chromatography
GO	graphene oxide
h	hour(s)
h ⁺	hole(s)
HAp	hydroxyapatite
H-bonding	hydrogen bonding
HDI	hexamethylene diisocyanate
HPLC	high performance liquid chromatography
HPU	hyperbranched polyurethane(s)
HPUNC	hyperbranched polyurethane nanocomposite(s)
HRTEM	high resolution transmission electron microscopy
HTPB	hydroxyl-terminated polybutadiene glycol
Hz	Hertz
ICP	inductively coupled plasma
IFFT	inverse fast Fourier transform
IPDI	isophorone diisocyanate
<i>i</i> PrOH	isopropanol
IR	infrared

J	Joule
kg	kilogram(s)
kJ	kilo Joule
kV	kilo Volt
LDI	(S)-Lysine diisocyanate
LPU	linear polyurethane
lux	illuminance
MeCN	acetonitrile
MDI	methylene diphenyl diisocyanate
MGE	monoglyceride
min	minute(s)
mL	milli litre(s)
mm	milli meter(s)
mV	milliVolt(s)
MMT	montmorillonite
mol	mole(s)
MPa	mega Pascal
MPA	2,2-Bis(hydroxymethyl)propionic acid
MSA	methane sulfonic acid
MW	microwave
MWCNT	multi-walled carbon nanotube(s)
N	Newton
NBDI	norbornane diisocyanate
NDI	naphthalene diisocyanate
NHC	<i>N</i> -heterocyclic carbene(s)
NIR	near IR
nm	nanometer
NMR	nuclear magnetic resonance
NP	nanoparticle(s)
OD	optical density
<i>P. aeruginosa</i>	<i>Pseudomonas aeruginosa</i>
<i>P. cepacia</i>	<i>Pseudomonas cepacia</i>
PBG	poly(xixolydimet oxide) glycol
PCL	poly(caprolactone)diol
PDI	polydispersity index
PDMS	polydimethylsiloxane

PEG	polyethylene glycol
PhMe	toluene
phr	parts per hundred rubber
PL	photoluminescence
PPG	poly(propylene oxide) glycol
ppm	parts per million
PHMEG	poly(hexamethylene oxide) glycol
PTMEG	poly(tetramethylene ether) glycol
PU	polyurethane(s)
PUNC	polyurethane nanocomposite(s)
rCD	reduced carbon dot
rGO	reduced graphene oxide
rpm	rotations per minute
<i>S. aureus</i>	<i>Staphylococcus aureus</i>
SAED	selected area electron diffraction
SEM	scanning electron microscopy
SHP	self healing polymer(s)
SCP	self cleaning polymer(s)
SFE	surface free energy
SME	shape memory effect
SMP	shape memory polymer(s)
SO	sunflower oil
SPR	surface plasmon resonance
SWCNT	single-walled carbon nanotube(s)
TBD	1,5,7-Triazabicyclo[4.4.0]dec-5-ene
TBHP	<i>tert</i> -butyl hydroperoxide
TDI	toluene diisocyanate
TEM	transmission electron microscopy
TEMPO	2,2,6,6-Tetramethylpiperidin-1-yl)oxyl
TGA	thermogravimetric analysis
THF	tetrahydrofuran
T _g	glass transition temperature
T _m	melting temperature
TLC	thin layer chromatography
TMS	tetramethylsilane

TOF	turnover frequency
TON	turnover number
TPU	thermoplastic polyurethane
UTM	universal testing machine
UV-Vis	ultraviolet-visible
VB	valence band
vol	volume
W	Watt
WERSA	water extract of rice straw ash
wt	Weight
XDI	<i>m</i> -Xylylene diisocyanate
XPS	X-ray photoelectron spectroscopy
XRD	X-ray diffraction
δ ppm	chemical shift in parts per million
μL	micro litre(s)
μm	micro meter(s)

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