

Contents

Abstract	i
Preface	vii
Acknowledgement	ix
Table of contents	xi
Abbreviations	xvi

Chapter 1: General introduction

1.1 Motivation and research background	1 - 1
1.2 Bulk heterojunction (BHJ) solar cells	1 - 3
1.2.1 Nanoparticles of interest	1 - 6
1.2.2 Polymers used in solar cell	1 - 11
1.3 Dye sensitized solar cells (DSSCs)	1 - 15
1.3.1 Polymer electrolyte based solar cells	1 - 16
1.3.2 A brief history of hybrid polymer electrolyte	1 - 19
1.3.3 Gelatin	1 - 21
1.3.4 ZnO photoanode for DSSCs	1 - 24
1.4 Synthetic routes of nanocrystals	1 - 27
1.4.1 Hydrothermal method of synthesis of ZnO nanorods	1 - 27
1.4.2 Seeded growth method of synthesis of Au nanorods	1 - 28
1.5 Synthesis of polymers	1 - 30
1.6 Preparation of gelatin hydrogel	1 - 31
1.7 Synthesis of polymer nanocomposites	1 - 33
1.8 Photovoltaic device characterization	1 - 34
1.9 Scope and objectives	1 - 36

Chapter 2: Effect of aspect ratio of zinc oxide and gold nanorods on the photovoltaic performance of poly(9-vinylcarbazole) based bulk heterojunction solar cells

2.1 Introduction	2 - 1
Section A: Hybrid bulk heterojunction solar cells based on poly(9-vinylcarbazole)/zinc oxide (ZnO) nanocomposites: effect of aspect ratio of ZnO nanorods	
2.2 Experimental	2 - 3
2.2.1 Reagents	2 - 3
2.2.2 Synthesis of ZnO nanorods	2 - 3
2.2.3 Synthesis of poly(9-vinylcarbazole)/ZnO nanocomposites	2 - 3
2.2.4 Fabrication of the device	2 - 4
2.3 Instruments and methods	2 - 4
2.4 Results and discussion	2 - 7
2.4.1 Growth mechanism of ZnO nanorods	2 - 8
2.4.2 Morphology (SEM-EDX)	2 - 9
2.4.3 Structural analysis (XRD, FT-IR)	2 - 11
2.4.4 Optical study (UV-visible, PL)	2 - 13
2.4.5 Thermogravimetric analysis (TGA)	2 - 17
2.4.6 Electrochemical (CV) analysis	2 - 18
2.4.7 Study of photovoltaic performance	2 - 19
2.5 Conclusion	2 - 21
Section B: Plasmonic bulk heterojunction photovoltaic devices based on poly (9-vinylcarbazole)/gold nanocomposites: effect of aspect ratio of gold nanorods	
2.6 Experimental	2 - 23
2.6.1 Reagents	2 - 23
2.6.2 Preparation of seed solution	2 - 23
2.6.3 Growth of nanorods	2 - 23
2.6.4 Synthesis of poly(9-vinylcarbazole)/Au nanocomposite	2 - 24
2.6.5 Fabrication of the photovoltaic device	2 - 25
2.7 Instruments and methods	2 - 25

2.8 Results and discussion	2 - 27
2.8.1 Growth mechanism of Au nanorods	2 - 27
2.8.2 Morphology (TEM, SEM and EDX)	2 - 28
2.8.3 Structural characteristics (FT-IR)	2 - 29
2.8.4 Optical analysis (UV-visible and PL)	2 - 30
2.8.5 Study of electrochemical behaviour (CV)	2 - 34
2.8.6 Study of photovoltaic performance	2 - 36
2.9 Conclusion	2 - 38

Chapter 3: Enhanced photo conversion efficiency of a hybrid bulk heterojunction device based on poly(3-octylthiophene)/zinc oxide nanocomposite

3.1 Introduction	3 - 1
3.2 Experimental	3 - 1
3.2.1 Reagents	3 - 1
3.2.2 Synthesis of ZnO nanorods	3 - 2
3.2.3 Synthesis of Poly (3-octylthiophene) (POT)	3 - 2
3.2.4 Synthesis of POT/ZnO nanocomposites	3 - 2
3.2.5 Fabrication of the photovoltaic device	3 - 3
3.3 Instruments and methods	3 - 3
3.4 Results and discussion	3 - 5
3.4.1 Size and morphology (SEM-EDX)	3 - 5
3.4.2 Structural (FT-IR) analysis	3 - 7
3.4.3 Optical study (UV-visible spectroscopy)	3 - 9
3.4.4 Thermogravimetric analysis (TGA)	3 - 11
3.4.5 Electrochemical analysis (CV)	3 - 13
3.4.6 Study of photovoltaic performance	3 - 14
3.5 Conclusion	3 - 16

Chapter 4: Development of dye-sensitized solar cells based on gold (Au)/gelatin gel electrolyte: effect of different aspect ratio of Au nanorods

4.1 Introduction	4 - 1
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4.2 Experimental	4 - 3
4.2.1 Reagents	4 - 3
4.2.2 Synthesis of Au nanorods	4 - 3
4.2.3 Synthesis of Au/gelatin gel electrolyte	4 - 4
4.2.4 Assembling of dye-sensitized solar cells	4 - 5
4.3 Instruments and methods	4 - 5
4.4 Results and discussion	4 - 7
4.4.1 Morphology (TEM, SEM)	4 - 7
4.4.2 Structural characteristics (FT-IR)	4 - 10
4.4.3 Optical characterization (UV-visible)	4 - 11
4.4.4 Evaluation of Electrochemical properties (EIS)	4 - 12
4.4.5 Study of thermal properties (TGA, DSC)	4 - 13
4.4.6 Photovoltaic performance evaluation	4 - 16
4.5 Conclusion	4 - 21

Chapter 5: A quasi solid state dye sensitized solar cell based on gelatin/multiwalled carbon nanotube gel electrolyte and zinc oxide (ZnO) nanorod photoanode

5.1 Introduction	5 - 1
5.2 Experimental	5 - 3
5.2.1 Reagents	5 - 3
5.2.2 Functionalization of MWCNT	5 - 3
5.2.3 Synthesis of gelatin/COOH-MWCNT gel electrolyte	5 - 3
5.2.4 Synthesis of ZnO nanorods	5 - 4
5.2.5 Preparation of photoanodes	5 - 4
5.2.6 Fabrication of DSSCs	5 - 5
5.3 Instruments and methods	5 - 5
5.4 Results and discussion	5 - 7
5.4.1 Morphology (TEM, SEM)	5 - 7
5.4.2 Structural analysis (XRD, FT-IR)	5 - 9

5.4.3 Optical analysis (UV-visible)	5 - 12
5.4.4 Electrochemical impedance spectroscopy (EIS)	5 - 13
5.4.5 Study of thermal properties (TGA, DSC)	5 - 16
5.4.6 Evaluation of photovoltaic performance	5 - 18
5.5 Conclusion	5 - 21

Chapter 6: Conclusion and future scope

6.1 Conclusion	6 - 1
6.2 Future Scope of the present investigation	6 - 4

Abbreviations used in the thesis

AMBIImI	1-(2-acryloyloxy-ethyl)-3-methyl-benzoimidazol-1-ium iodide
AM1.5	Air mass 1.5
-CHO	Aldehyde group
3AT	3-Alkylthiophene
C _n TAB	Alkyl trimethyl ammonium bromide
Al	Aluminium
AZO	Aluminium doped zinc oxide
-NH ₂	Amino group
CH ₃ COONH ₄	Ammonium acetate
NH ₄ I	Ammonium iodide
a-Si	Amorphous silicon
AAO	Anodic aluminium oxide
aq	Aqueous
AR	Aspect ratio
AIBN	2,2'-azo-bis-isobutyrylnitrile
BPO	Benzoyl peroxide
bis-PCBM	Bisadduct analogue of [60]PCBM
BHJ	Bulk heterojunction
BMII	Butyl-methyl imidazolium iodide
BMImI	1-Butyl-3-methylimidazolium iodide
CdS	Cadmium sulfide
CdTe	Cadmium telluride
COOH-MWCNT	Carboxy functionalized multiwalled carbon nanotube
-COOH	Carboxyl
CMC	Carboxymethyl cellulose
C ₁₆ PC	Cetylpyridinium chloride

CTA ⁺	Cetyltrimethylammonium ion
CTAB	Cetyl trimethyl ammonium bromide
CT	Charge transfer
CVD	Chemical vapour deposition
HAuCl ₄	Chloroauric acid
N3	cis-Bis(isothiocyanato) bis(2,2'-bipyridyl-4,4'-dicarboxylato ruthenium(II))
CB	Conduction band
CIGS	Copper indium gallium selenide
CuK _α	Copper-K _α X-ray radiation
CuSCN	Copper(I) thiocyanate
CN-HPC	Cyanoethylated hydroxypropyl cellulose
CV	Cyclic voltammetry
DSC	Differential scanning calorimetry
DTG	Differential thermogram
N719	di-Tetrabutylammonium-cis-bis(isothiocyanato)bis(2,2'-bipyridyl-4,4'-dicarboxylato) ruthenium(II)
DWCNT	Double walled carbon nanotube
DSSCs	Dye sensitized solar cells
EDX	Energy dispersive X-ray spectroscopy
EC	Ethylene carbonate
EMIM Ac	1-Ethyl-3-methylimidazolium acetate
D*	Excited state of dye
EQE	External quantum efficiency
FeCl ₃	Ferric chloride
FF	Fill factor
FTO	Fluorine doped tin oxide
FT-IR	Fourier transform infra-red

C ₆₀	Fullerene
GHEs	Gelatin hydrogel electrolytes
Au	Gold
D	Ground state of dye
C ₆ DMII	1-Hexyl-2,3-dimethylimidazolium iodide
HOMO	Highest occupied molecular orbital
HTL	Hole-transporting layer
-OH	Hydroxyl
ICBA	Indene-C ₆₀ bisadduct
ITO	Indium tin oxide
I ⁻ /I ₃ ⁻	Iodide/triiodide
I ₂	Iodine
LiI	Lithium iodide
LiClO ₄	Lithium perchlorate
LiBF ₄	Lithium tetrafluoroborate
LSPR	Localized surface plasmon resonance
LUMO	Lowest unoccupied molecular orbital
MOCVD	Metal organic chemical vapour deposition
MPN	3-Methoxypropionitrile
MHII	1-Methyl-3-hexylimidazolium iodide
MPII	1-Methyl-3-propylimidazolium iodide
NMP	N-methyl 2-pyrrolidone
MFC	Microfibrillated cellulose
MWCNT	Multiwalled carbon nanotube
NC	Nanocrystal
NP	Nanoparticle
NR	Nanorod

NS	Nanosphere
NT	Nanotube
NW	Nanowire
Zn _i	Neutral zinc interstitial
V _{Zn} ⁰	Neutral zinc vacancy
N ₂	Nitrogen
3OT	3-Octylthiophene
1-D	One dimensional
V _{oc}	Open circuit voltage
PC ₆₀ BM	Phenyl-C ₆₀ -butyric-acid-methyl ester
PCBM	[6,6]-Phenyl-C ₆₁ -butyric-acid-methyl ester
PC ₇₀ BM	Phenyl-C ₇₀ -butyric-acid-methyl ester
P-Ru dye	Phosphonated ruthenium polypyridyl dye
PCE	Photo conversion efficiency
PL	Photoluminescence
PV	Photovoltaic
Pt	Platinum
PAA	Poly(acrylic acid)
poly(AMImI)	Poly(1-(2-acryloyloxy-ethyl)-3-methyl-imidazol-1-ium iodide)
P3AT	Poly(3-alkylthiophene)
PBDT-DTBT	Polybenzo[2,1-b:3,4-b']dithiophene-4,7-Di(thiophen-2-yl)benzothiadiazole
PCPDTBT	Poly[2,6-(4,4-bis-(2-ethylhexyl)-4H-cyclopenta-[2,1-b;3,4-b']-dithiophene)-alt-4,7-(2,1,3-benzothiadiazole)]
P3CT	Poly(3-carboxydithiophene)
PFSDCN	Poly[2,7-(9,9-dioctylfluorene)-alt-2-((4-(diphenylamino)phenyl) thiophen-2-yl) malononitrile]
PDDC	Poly(9-dodecylcarbazole)
PDDCT	Poly[(9-dodecylcarbazole)-co-thiophene]

PEDOT:PSS	Poly(3,4-ethylenedioxythiophene) polystyrene sulfonate
PEG	Poly(ethylene glycol)
PEO	Poly(ethylene oxide)
PEODME	Poly(ethylene oxide dimethyl ether)
PCDTBT	Poly[N-9''-hepta-decanyl-2,7-carbazole-alt-5,5-(4',7'-di-2thienyl-2',1',3'-benzothiadiazole
P3HT	Poly(3-hexylthiophene)
MDMO-PPV	Poly[2-methoxy-5-(3',7'-dimethyloctyloxy)-1,4-phenylenevinylene]
MEH-PPV	Poly[2-methoxy-5-(2-ethylhexyloxy)]-1,4-phenylenevinylene
POT	Poly(3-octylthiophene)
POEM	Poly(oxyethylene)-segmented amides and imides
PPV	Poly(p-phenylene vinylene)
PU	Polyurethane
PVK	Poly(9-vinylcarbazole)
PVDF-HFP	Poly(vinylidene fluoride-co-hexafluoropropylene)
PVP	Poly(4-vinylpyridine)
KBr	Potassium bromide
KI	Potassium iodide
PC	Propylene carbonate
RTIL	Room temperature ionic liquids
SEM	Scanning electron microscopy
SAED	Selected area electron diffraction
J_{sc}	Short circuit current density
SiO_2	Silica
Ag	Silver
AgBr	Silver bromide
AgCl	Silver chloride
$AgNO_3$	Silver nitrate

V_o^+	Singly ionized oxygen vacancy
Zn_i^+	Singly ionized zinc interstitial
SWCNT	Single walled carbon nanotube
$NaBH_4$	Sodium borohydride
$NaCl$	Sodium chloride
$NaOH$	Sodium hydroxide
NaI	Sodium iodide
$NaSCN$	Sodium thiocyanate
SPR	Surface plasmon resonance
TBP	Tertiary butyl pyridine
THF	Tetrahydrofuran
spiro-OMeTAD	2,2,7,7-Tetrakis-(N,N-di-p-methoxyphenylamine)-9,9-spirobifluorene
Pr_4NI	Tetrapropylammonium iodide
TGA	Thermogravimetric analysis
TiO_2	Titanium dioxide
$TiCl_4$	Titanium tetrachloride
TEM	Transmission electron microscopy
SD2	Triphenylamine dye
UV	Ultraviolet
UV-visible	Ultraviolet-visible
NVK	9-Vinylcarbazole
VTF	Vogel-Tamman-Fulcher
XRD	X-ray diffractometer or X-ray diffraction
$Zn(CH_3COO)_2$	Zinc acetate
$Zn(OH)_2$	Zinc hydroxide
ZnO	Zinc oxide
$Zn-(CF_3SO_3)_2$	Zinc triflate

cm	Centimeter
R_{ct1}	Charge transfer resistance at the counter electrode/electrolyte interface
R_{ct2}	Charge transfer resistance at the electrolyte/TiO ₂ electrode interface OR Charge recombination resistance at the photoanode
$\eta_{transport}$	Charge transport within the solid to the solid-liquid interface
°C	Degree centigrade
θ	Diffraction angle
E_g^{ec}	Electrochemical band gap
eV	Electronvolt
λ_{ex}	Excitation wavelength
FWHM	Full width at half-maxima
T_g	Glass transition temperature
g	Gram
h	Hour
IPCE	Incident photon conversion efficiency
$\eta_{interface}$	Interfacial charge transfer across the solid-liquid interface
δ	Ionic conductivity
keV	Kilo-electronvolt
k Ω	Kilo ohm
kW	Kilowatt
kV	Kilovolt
T_d	Major degradation temperature
P_{max}	Maximum power
J_{max}	Maximum value of photocurrent density
V_{max}	Maximum value of voltage
m	Meter
μ L	Microlitre

mA	Milliampere
mAcm^{-2}	Milliampere per square centimeter
mg	Milligram
mL	Millilitre
mM	Millimolar
mV	Millivolt
mW	Milliwatt
min^{-1}	Minute ⁻¹
M	Molar
nm	Nanometer
pH	Negative logarithm of hydrogen ion concentration
$\Omega\text{-cm}$	Ohm-centimeter
Ω/sq	Ohm per square (sheet resistance with a uniform sheet thickness)
ϕ_{ox}	Onset oxidation potentials
ϕ_{red}	Onset reduction potentials
E_{g}^{op}	Optical band gap
Pa	Pascal
η	Photo conversion efficiency
J	Photocurrent density
P_{in}	Power of the incident light
rpm	Revolutions per minute
s	Second
R_{s}	Series resistance
I_{sc}	Short-circuit current
Scm^{-1}	Siemen per centimeter
K_{sp}	Solubility product
V	Volt or Voltage