

List of Symbols

a_0	Lattice constant
a_{ZnO}	Lattice constant of ZnO
a_{Si}	Lattice constant of Si
c_0	Height of unit cell
c	Velocity of light
C	Small – signal capacitance
$^{\circ}C$	Degree centigrade
ν	Frequency of light
h^+	Hole
e^-	Electron
n	n-type semiconductor
p	p-type semiconductor
u	The length of the bond parallel to the c axis, in unit of c
β	Full width at half maximum (FWHM)
λ	Wavelength
γ	smallest integer (dimensionless) greater than η
δ	Thickness of the interfacial layer
θ	Angle of diffraction
d	Spacing between consecutive parallel planes
n	Glancing angle
ϵ_0	Permittivity of vacuum
ϵ_s	Dielectric constant of semiconductor
ϵ_i	Permittivity of interfacial layer
σ_0	Zero bias standard deviation
σ	Standard deviation
$\sigma(V)$	Bias-dependent standard deviation
η	Ideality factor
$\eta(T)$	Apparent ideality factor
$\eta(V)$	Voltage dependent ideality factor
η_{QE}	Quantum efficiency
W_d	Depletion width
D	Average grain size
D_{opt}	Voltage dependent detectivity
N_D	Effective donor density
N_V	Effective acceptor density
q	Elementary charge

Q_{sc}	Accumulated space charge in the depletion region
ϕ_m	Work function of metal
ϕ_s	Work function of semiconductor
ϕ_B	Schottky barrier height
$\phi_{B,eff}$	Effective Schottky Barrier height
$\phi_{B0,m}$	Mean value of barrier height
$\phi_{B,eff}(T)$	Apparent effective barrier height
ϕ_e	Voltage dependent barrier height
$P(\phi_{B,eff})$	Normalized Gaussian distribution function for the spatial barrier height distribution across the junction
I	Total current
I_F	Current at forward bias voltage
I_R	Current at reverse bias voltage
I_0	Reverse saturation current
I_{min}	Minimum current corresponding to voltage V_0
$I(\phi_{B,eff}, V)$	Current at bias V for the Schottky barrier height $\phi_{B,eff}$ based on thermionic emission model
V	Applied voltage
V_{bi}	Built in potential
V_{on}	On voltage of device
V_{d0}	Diffusion voltage
h	Planck's constant
J_n	Total current density
J_S	Saturation current density
T	Absolute temperature
k	Boltzmann's constant
$^{\circ}\text{K}$	Unit of temperature in Kelvin
E	Total energy
V_0	Voltage at minimum point of applied voltage
ΔE_C	Conduction band offset
ΔE_V	Valance band offset
E_V	Valance band edge
E_C	Conduction band edge
E_F	Position of Fermi level in a semiconductor
E_{NBE}	Near band edge exciton energy
E_{ss}	Energy of interface states
A	Effective area of the diode
A^*	Richardson constant
m_0	Rest mass of electron
m^*	Effective mass of electron

$F(V)$	Norde's function
$F(V_0)$	is the minimum point of $F(V)$
F	Farad (unit of capacitance)
$N(E)$	Density of states
$H(I)$	Cheung's function
E_g	Bandgap
χ_M	Electron affinity of metal
χ_s	Electron affinity of semiconductor
$\rho_1 \rho_2$	Voltage deformation coefficients depend upon temperature
V_{Zn}	Zinc vacancies
V_O	Oxygen vacancies
V_{on}	Turn on voltage
Zn_i	Zinc interstitials
Zn_i^+	Single ionized Zn interstitials
O_i	Oxygen interstitials
V_O^+	Single ionized oxygen vacancy
R_s	Series resistance
R_i	Bias dependent resistance of the diode
R	Responsivity
R_0A	Zero bias resistance-area product
RA	Resistance-area product
P_{opt}	Incident optical power
I_{ph}	Photocurrent
N_{ss}	Effective density of interface states

List of Abbreviations

0D	Zero Dimensional
1D	One Dimensional
2D	Two Dimensional
3D	Three Dimensional
HCP	Hexagonal Close Packing
TE	Thermal Evaporation
GD	Gaussian Distribution
CVD	Chemical Vapor Deposition
ALD	Atomic Layer Deposition
VPT	Vapor Phase Transport
MBE	Molecular beam epitaxy
PLD	Pulse Laser Deposition
RF	Radio Frequency
AS	Admittance Spectroscopy
PL	Photoluminescence
CL	Cathodoluminescence
FESEM	Field Emission Scanning Electron Microscopy
SEM	Scanning Electron Microscopy
EDS	Energy Dispersive X-ray Spectroscopy
AFM	Atomic Force Microscopy
XRD	X-ray Diffraction
TFT	Thin Film Transistor
LED	Light Emitting Diodes
SBH	Schottky Barrier Height
TFE	Thermionic Field Emission
UV	Ultraviolet
MSM	Metal-Semiconductor-Metal
MIS	Metal- Insulator- Semiconductor
MISIM	Metal-Insulator-Semiconductor-Insulator-Metal
AZO	Al doped ZnO
BHI	Barrier Height Inhomogeneity
ITO	Indium Tin Oxide
BM	Burstein-Moss
HT	Hydrothermal Method
CSP	Chemical Spray Pyrolysis
ECD	Electro Chemical Deposition
MOCVD	Molecular Organic Chemical Vapour Deposition
SG	Sol-Gel
HJ	Heterojunction
CMOS	Complementary Metal–Oxide–Semiconductor
M-S	Metal –Semiconductor
C-V	Capacitance-Voltage
I-V	Current-Voltage
VS	Vapour–Solid
VLS	Vapour–Liquid-Solid
RHEED	Reflection High-Energy Electron Diffraction
FWHM	Full-Width at Half-Maximum
LAMBD	Laser Assisted Molecular Beam Deposition