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APPENDIX

LIST OF SYMBOLS

A	diode ideality factor
$D_{n,p}$	diffusion coefficient (electron, hole) as minority carrier
E_{Fi}	intrinsic Fermi level
E^*	characteristic energy of an exponential distribution of trap states
E_{00}	characteristic tunneling energy defined by Eq. (3.23)
E_a	activation energy
G	shunt conductance
I_L	light generated current
I_0	reverse saturation leakage current
I_{sc}	short circuit current
k	Boltzmann constant
$L_{n,p}$	diffusion lengths, electron, hole
$l_{1,2}$	depletion region width in semiconductor 1 and 2
m_e^*	effective mass of the electron
m_h^*	effective mass of hole
n_p, p_n	non-equilibrium concentration of electron and hole respectively
n_{po}, p_{no}	equilibrium concentration of electron and hole respectively
n_0	electron concentration in the conduction band per unit volume at thermal equilibrium
n_i	intrinsic electron concentration
n_d	electron concentration in the donor energy states
N_d	donor density

N_a	acceptor density
$N_{C(E)}$	effective density of states in the conduction band
$N_{V(E)}$	effective density of states in the valence band
N_t	band gap state density of traps at the energy level E_t
N_I	density of interface states
p_a	hole concentration in the acceptor energy states
p_0	hole concentration in the valence band per unit volume at thermal equilibrium
p_i	intrinsic hole concentration
R	net recombination rate
s_I	interface recombination velocity
S_I	electron capture cross section of interface states
T	absolute temperature
v_{th}	carrier thermal velocity
V_{oc}	open circuit voltage of the solar cell with illumination applied
V_{bi}	built-in voltage
w	width of space charge region
X	transmission coefficient for carriers across the junction
$x_{n,p}$	depletion distances
ϕ_s	work function
ϕ_b	barrier height seen by electrons
ϕ_b^p, ϕ_b^n	barrier height for hole and electron
ξ	electrostatic field in thermodynamic equilibrium
ρ	charge density

$\delta_{n,p}$	separation in energy of the Fermi level and the respective energy band edge
ε_s	dielectric constant of the semiconductor
χ	electron affinity of a semiconductor
$\sigma_e(\sigma_h)$	electron (hole) capture cross section of trap
$\tau_{no,po}$	lifetime of electrons (holes) as minority carriers in a semiconductor
τ_n	lifetime of an electron to recombine with a hole
τ_p	lifetime of a hole to recombine with an electron
ΔE_C	energy step in conduction band energy diagram of a heterojunction (associated with electron affinity difference)
ΔE_v^{ab}	the valence band discontinuities at the buffer/absorber interface
ΔE_c^{ab}	the conduction band discontinuities at the buffer/absorber interface

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