Room temperature properties of		*Si*	*GaAs*	*GaN*	*(Unit)*
Lattice constant	a_0 =	5.43095	5.6533	a_0 = 3.189 c_0 = 5.185	Å Å
Bandgap energy	E_g =	1.12	1.42	3.4	eV
Intrinsic carrier concentration	n_i =	1×10^{10}	2×10^{6}	2×10^{-10}	cm^{-3}
Effective DOS at CB edge	N_c =	2.8×10^{19}	4.7×10^{17}	2.3×10^{18}	cm^{-3}
Effective DOS at VB edge	N_v =	1.0×10^{19}	7.0×10^{18}	1.8×10^{19}	cm^{-3}
Electron mobility	μ_n =	1500	8500	1500	$cm^2/(Vs)$
Hole mobility	μ_p =	450	400	30	$cm^2/(Vs)$
Electron diffusion constant	D_n =	39	220	39	cm^2 / s
Hole diffusion constant	D_p =	12	10	0.75	cm^2 / s
Minority carrier lifetime	τ =	10^{-6}	10^{-8}	10^{-9}	s
Electron effective mass	m_e^* =	0.98 m_e	0.067 m_e	0.2 m_e	–
Heavy hole effective mass	m_{hh}^* =	0.49 m_e	0.45 m_e	0.8 m_e	–
Relative dielectric constant	ε_r =	11.9	13.1	8.9	–
Refractive index	$n_{optical}$ =	3.3	3.4	2.5	–
Absorption coefficient near E_g	α =	10^3	10^4	10^4	cm^{-1}

Note:

- DOS = Density of states. CB = Conduction band. VB = Valence band.
- Diffusion constants and mobilities are related by Einstein's relation: $D = \mu\,(k\,T / e)$
- Minority carrier diffusion lengths are given by $L_n = (D_n\tau)^{1/2}$ and $L_p = (D_p\tau)^{1/2}$
- The mobilities and diffusion constants apply to low doping concentrations ($\approx 10^{15}$ cm^{-3}). As the doping concentration increases, mobilities and diffusion constants decrease.
- The minority carrier lifetime τ applies to doping concentrations of 10^{18} cm^{-3}. For other doping concentrations, τ is given by $\tau = B^{-1}\,(n + p)^{-1}$, where $B_{GaAs} \approx 10^{-10}$ cm^3/s, $B_{Si} \approx 10^{-12}$ cm^3/s, and $B_{GaN} \approx 10^{-10}$ cm^3/s.

Room temperature properties of		*SiO_2*	*and*	*Si_3N_4*
Bandgap energy	E_g =	9.0 eV		5.0 eV
Dielectric constant	ε_r =	3.9		7.5
Refractive index	$n_{optical}$ =	1.46		2.05
Dielectric strength (or breakdown field)	E =	10^7 V/cm		10^7 V/cm