ภาคผนวก

ก. ตัวพหุคูณ

Multiple	Prefix	Symbol	Multiple	Prefix	Symbol
10^{18}	exa	E	10^{-1}	deci	d
10^{15}	peta	P	10^{-2}	centi	c
10^{12}	tera	T	10^{-3}	milli	m
10^{9}	giga	G	10^{-6}	micro	μ
10"	mega	M	10^{-9}	nano	n
10'	kilo	k	10^{-12}	pico	p
10^{2}	hecto	h	10^{-15}	femto	f
10	deka	da	10^{-18}	atto	a

"Adopted by International Committee on Weights and Measures. (Compound prefixes should not be used; e.g., not $\mu\mu$ but p.)

ข. อักษรกรีก

Letter	Lowercase	Uppercase	Letter	Lowercase	Uppercase
Alpha	α	A	Nu	ν	N
Beta	β	B	Xi	ξ	Ξ
Gamma	γ	Γ	Omicron	o	0
Delta	δ	A	Pi	π	Π
Epsilon	ϵ	E	Rho	ρ	P
Zeta	ζ	Z	Sigma	σ	Σ
Eta	η	H	Tau	τ	T
Theta	θ	Θ	Upsilon	υ	Υ
rota	ι	I	Phi	ϕ	Φ
Kappa	κ	K	Chi	χ	X
Lambda	λ	A	Psi	ψ	Ψ
MU	μ	M	Omega	ω	Ω

ค. ค่าคงตัวทางฟิสิกส์

Quantity	Symbol	Value
Angstrom unit	Å	$1\ Å = 10^{-4}\ \mu m = 10^{-8}$ cm
Avogadro constant	N_{AVO}	**6.02204** x 10^{23} mol^{-1}
Bohr radius	a_B	0.52917 Å
Boltzmann constant	**k**	**1.38066** $\times 10^{-23}$ J/K (R/N_{AVO})
Elementary charge	7	1.60218×10^{-19} C
Electron rest mass	m_0	0.91095×10^{-30} kg
Electron volt	eV	$1\ eV = 1.60218 \times 10^{-19}$ J **= 23.053** kcal/mol
Gas constant	R	1.98719 cal mol^{-1} K^{-1}
Permeability in vacuum	μ_0	1.25663×10^{-8} H/cm $(4\pi \times 10^{-9})$
Permittivity in vacuum	ϵ_0	**8.85418** $\times 10^{-14}$ F/cm $(1/\mu_0 c^2)$
Planck constant	h	**6.62617** x 10^{-34} J-s
Reduced Planck constant	$\hbar$	**1.05458~** IO-"J-s $(h/2\pi)$
Proton rest mass	M_p	**1.67264** x 10^{-27} kg
Speed of light in vacuum	c	**2.99792** x 10^{10} cm/s
Standard atmosphere		1.01325×10^5 N/m^2
Thermal voltage at 300 K	kT/q	**0.0259** V
Wavelength of 1-eV quantum	λ	**1.23977** pm

ง. คุณสมบัติของสารกึ่งตัวนำที่สำคัญบางชนิด

Semiconductor		Bandgap (eV) 300 K	Bandgap (eV) 0 K	Mobility at 300 K ($cm^2/V\text{-}s$)[a] Elec.	Mobility at 300 K ($cm^2/V\text{-}s$)[a] Holes	Band[b]	Effective Mass m^*/m_0 Elec.	Effective Mass m^*/m_0 Holes	ϵ_s/ϵ_0
Element	C	5.47	5.48	1800	1200	I	0.2	0.25	5.7
	Ge	0.66	0.74	3900	1900	I	1.64[c]	0.04	16.0
							0.082[c]	0.28	
	Si	1.12	1.17	1500	450	I	0.9X[c]	0.16	11.9
							0 19[d]	0.49	
	Sn		0 082	1400	1200	D			
IV-IV	α-SiC	2.996	3.03	400	S0	I	0.60	1.00	10.0
III-V	AlSb	1.58	1.68	200	420	I	0. I2	0.98	14.4
	BN	-1.5				I			7. I
	BP	2.0							
	GaN	3.36	3.50	380			0.19	0.60	12.2
	GaSb	0.72	0.8 I	5000	850	D	0.042	0.40	15.7
	GaAs	1.42	1.52	8500	400	D	0.067	0.082	13.1
	GaP	2.26	2 34	110	75	I	0.82	0.60	11.1
	InSb	0.17	0.23	80000	1250	D	0 0145	0.40	17.7
	InAs	0.36	0.42	33000	460	D	0.023	0.40	14.6
	InP	1.35	1.42	4600	150	D	0.077	0.64	12.4
II-VI	CdS	2.42	2.56	340	50	D	0.2 I	0.80	5.4
	CdSe	1.70	1.85	800		D	0.13	0.45	10.0
	CdTe	1.56		1050	100	D			10.2
	ZnO	3.35	3.42	200	180	D	0.27		9.0
	ZnS	3.68	3.84	165	5	D	0.40		5.2
IV-VI	PbS	0.41	0.286	600	700	I	0.25	0.25	17.0
	PbTe	0.3 I	0.19	bow	4000	I	0.17	0.20	30.0

จ. คุณสมบัติของ Ge Si และ GaAs ที่ 300°K

Properties	Ge	Si	GaAs
Atoms/cm³	4.42×10^{22}	5.0×10^{22}	4.42×10^{22}
Atomic weight	72.60	28.09	144.63
Breakdown field (V/cm)	$\sim 10^5$	$\sim 3 \times 10^5$	$\sim 4 \times 10^5$
Crystal structure	Diamond	Diamond	Zincblende
Density (g/cm³)	5.3267	2.328	5.32
Dielectric constant	16.0	11.9	13.1
Effective density of states in conduction band, N_C (cm⁻³)	1.04×10^{19}	2.8×10^{19}	4.1×10^{17}
Effective density of states in valence band, N_V (cm⁻³)	6.0×10^{18}	1.04×10^{19}	7.0×10^{18}
Effective Mass, m^*/m_0			
Electrons	$m_l^* = 1.64$ $m_t^* = 0.082$	$m_l^* = 0.98$ $m_t^* = 0.19$	0.067
Holes	$m_{lh}^* = 0.044$ $m_{hh}^* = 0.28$	$m_{lh}^* = 0.16$ $m_{hh}^* = 0.49$	$m_{lh}^* = 0.082$ $m_{hh}^* = 0.45$
Electron affinity, χ(V)	4.0	4.05	4.07
Energy gap (eV) at 300K	0.66	1.12	1.424
Intrinsic carrier concentration (cm⁻³)	2.4×10^{13}	1.45×10^{10}	1.79×10^6
Intrinsic Debye length (μm)	0.68	24	2250
Intrinsic resistivity (Ω-cm)	47	2.3×10^5	10^8
Lattice constant (A)	5.64613	5.43095	5.6533
Linear coefficient of thermal expansion, $\Delta L/L\Delta T$ (°C⁻¹)	5.8×10^{-6}	2.6×10^{-6}	6.86×10^{-6}
Melting point (°C)	937	1415	1238
Minority carrier lifetime (s)	10^{-3}	2.5×10^{-3}	$\sim 10^{-8}$
Mobility (drift) (cm^2/V-s)			
	3900	1500	8500
	1900	450	400
Optical-phonon energy (eV)	0.037	0.063	0.035
Phonon mean free path λ_0 (Å)	105	76 (electron) 55 (hole)	58
Specific heat (J/g-°C)	0.31	0.7	0.35
Thermal conductivity at 300 K (W/cm-°C)	0.6	1.5	0.46
Thermal diffusivity (cm^2/s)	0.36	0.9	0.24
Vapor pressure (Pa)	1 at 1330°C 10^{-6} at 760°C	1 at 1650°C 10^{-6} at 900°C	100 at 1050°C 1 at 900°C