$N_{Avogadro}$= 6.023 E 23 atoms 1eV= 1.6E-19 J h=6.63e-34 Js c=3e8 m/s

K_B= 8.617 3324(78)×10^{-5} eV/K K_BT(298 K)= 0.025 eV

E=hv=hc/λ dhkl= a /SQRT(h^2+k^2+l^2) $E_n = E_0/n^2$ E_0=-13,6eV

$$p = N_V \exp\left(\frac{E_V - E_F}{kT}\right) \qquad n = N_C \exp\left(\frac{E_F - E_C}{kT}\right) \qquad np = n_i^2$$

$$E_F = \frac{E_C + E_V}{2} + \frac{kT}{2}\ln\left(N_V/N_C\right) \qquad np = N_C N_V \exp\left(\frac{E_V - E_C}{kT}\right) = N_C N_V \exp\left(-\frac{E_g}{kT}\right)$$

$$\sigma = q\left(n\mu_n + p\mu_p\right) \qquad D = \frac{kT}{q}\mu \qquad L_p = \sqrt{D_p \tau_p}$$

For Si at 300k

$$N_C = 2.86 \times 10^{19}\ \text{cm}^{-3} \qquad N_V = 3.10 \times 10^{19}\ \text{cm}^{-3} \qquad E_g = 1.124\ \text{eV}$$
$$n_i = 1.08 \times 10^{10}\ \text{cm}^{-3}$$

for GaAs, $n_i = 1.79 \times 10^6\ \text{cm}^{-3}$

$$I_o = \left(\frac{qD_n n_i^2}{L_n N_A} + \frac{qD_p n_i^2}{L_p N_D}\right) \qquad I = I_0\left(\exp U_A/U_T - 1\right)$$

$$I_{total} = I_0(e^{qV/kT} - 1) - I_L \qquad V_{oc} = \frac{kT}{q}\ln(\frac{I_L}{I_0} + 1) \qquad SR(\lambda) = \frac{I_{sc}}{P_{opt}} \qquad SR(\lambda) = \frac{q\lambda}{hc} EQE$$

$I = Io \exp(-\alpha x)$

$$C(x,t) = C_s erfc\left\{\frac{x}{2\sqrt{Dt}}\right\} \qquad C(x,t) = \frac{S}{\sqrt{\pi Dt}}\exp\left\{\frac{-x^2}{4Dt}\right\}$$

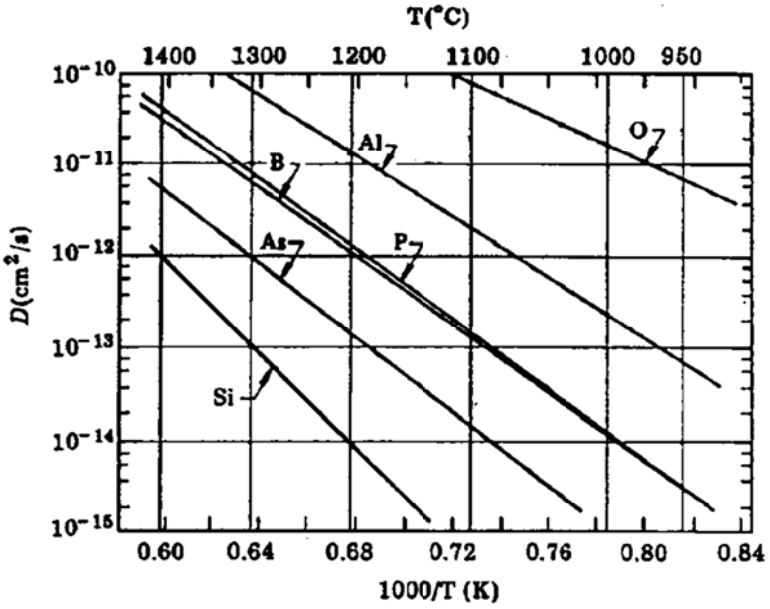
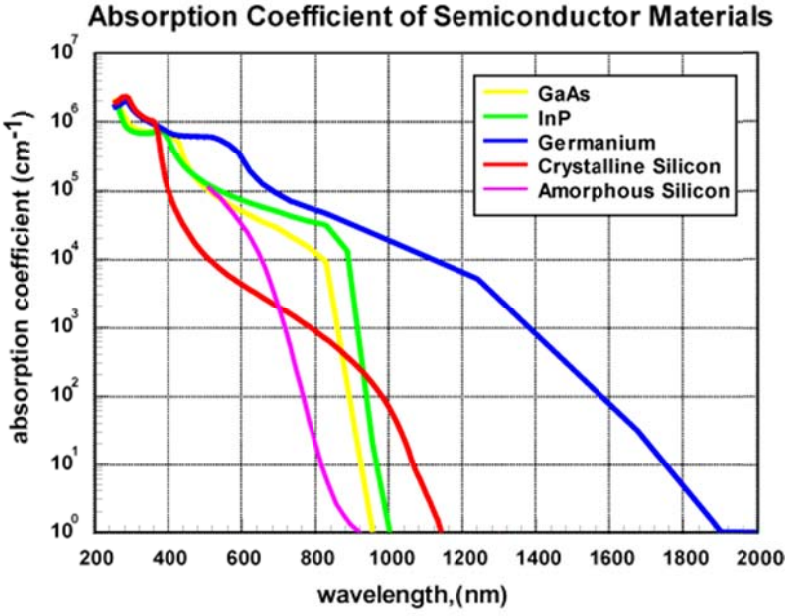
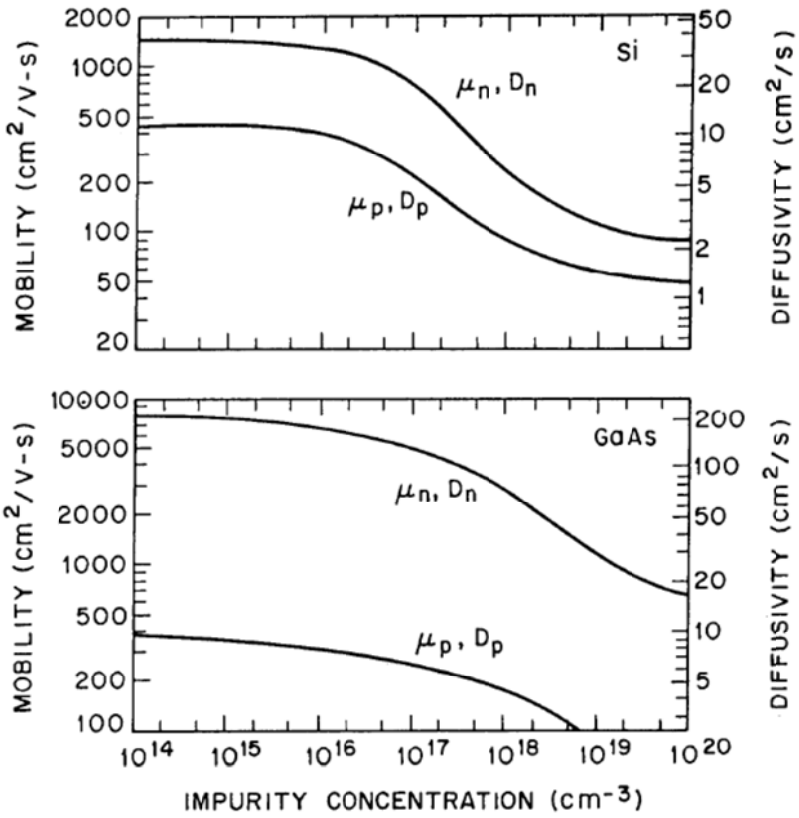


TABLE 1 EQUILIBRIUM SEGREGATION COEFFICIENTS FOR DOPANTS IN SI

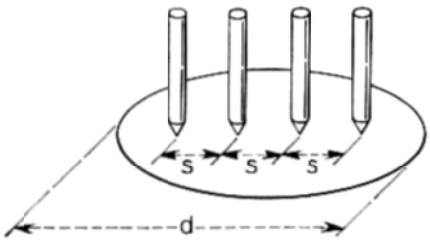
Dopant	k_0	Type	Dopant	k_0	Type
B	8×10^{-1}	*p*	As	3.0×10^{-1}	*n*
Al	2×10^{-3}	*p*	Sb	2.3×10^{-2}	*n*
Ga	8×10^{-3}	*p*	Te	2.0×10^{-4}	*n*
In	4×10^{-4}	*p*	Li	1.0×10^{-2}	*n*
O	1.25	*n*	Cu	4.0×10^{-4}	—[a]
C	7×10^{-2}	*n*	Au	2.5×10^{-5}	—[a]
P	0.35	*n*			

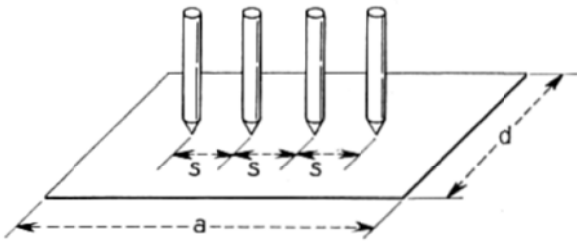
[a]Deep-lying impurity level.





w	erf w	w	erf w	w	erf w
0.00	0.00000	0.36	0.38933	1.04	0.85865
0.02	0.02256	0.38	0.40901	1.08	0.87333
0.04	0.04511	0.40	0.42839	1.12	0.88679
0.06	0.06762	0.44	0.46622	1.16	0.89910
0.08	0.09008	0.48	0.50275	1.20	0.91031
0.10	0.11246	0.52	0.53790	1.30	0.93401
0.12	0.13476	0.56	0.57162	1.40	0.95228
0.14	0.15695	0.60	0.60386	1.50	0.96611
0.16	0.17901	0.64	0.63459	1.60	0.97635
0.18	0.20094	0.68	0.66378	1.70	0.98379
0.20	0.22270	0.72	0.69143	1.80	0.98909
0.22	0.24430	0.76	0.71754	1.90	0.99279
0.24	0.26570	0.80	0.74210	2.00	0.99532
0.26	0.28690	0.84	0.76514	2.20	0.99814
0.28	0.30788	0.88	0.78669	2.40	0.99931
0.30	0.32863	0.92	0.80677	2.60	0.99976
0.32	0.34913	0.96	0.82542	2.80	0.99992
0.34	0.36936	1.00	0.84270	3.00	0.99998





$$\rho_s = \frac{V}{I} C$$

d/s	circle diam d/s	$a/d = 1$	$a/d = 2$	$a/d = 3$	$a/d \geqq 4$
1.0				0.9988	0.9994
1.25				1.2467	1.2248
1.5			1.4788	1.4893	1.4893
1.75			1.7196	1.7238	1.7238
2.0			1.9454	1.9475	1.9475
2.5			2.3532	2.3541	2.3541
3.0	2.2662	2.4575	2.7000	2.7005	2.7005
4.0	2.9289	3.1137	3.2246	3.2248	3.2248
5.0	3.3625	3.5098	3.5749	3.5750	3.5750
7.5	3.9273	4.0095	4.0361	4.0362	4.0362
10.0	4.1716	4.2209	4.2357	4.2357	4.2357
15.0	4.3646	4.3882	4.3947	4.3947	4.3947
20.0	4.4364	4.4516	4.4553	4.4553	4.4553
40.0	4.5076	4.5120	4.5129	4.5129	4.5129
∞	4.5324	4.5324	4.5324	4.5325	4.5324