Example 2.2 Calculate the energy bandgap of germanium, silicon and gallium arsenide at 300, 400, 500 and 600 K.

Solution The bandgap of silicon at 300 K equals:

$$E_g(300\text{ K}) = E_g(0\text{ K}) - \frac{a\,T^2}{T+b}$$

$$= 1.166 - \frac{0.473\times10^{-3}\times(300)^2}{300+636} = 1.12\text{ eV}$$

Similarly one finds the energy bandgap for germanium and gallium arsenide, as well as at different temperatures, yielding:

	Germanium	Silicon	Gallium Arsenide
T = 300 K	0.66 eV	1.12 eV	1.42 eV
T = 400 K	0.62 eV	1.09 eV	1.38 eV
T = 500 K	0.58 eV	1.06 eV	1.33 eV
T = 600 K	0.54 eV	1.03 eV	1.28 eV