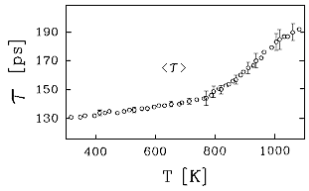
4.1.2 Essentials to Chapter 4.1: Experimental Techniques for Studying Point Defects in Equilibrium

- Essentially we have two rather direct methods
  - Differential Thermal Expansion (or $\Delta l/l - \Delta a/a$ -method).
  - .Positron annihilation
- Both methods will not give results if the vacancy concentration at the melting point is below, roughly, 10^{-7}.

$$3\left(\frac{\Delta l}{l} - \frac{\Delta a}{a}\right) = c_V - c_i$$



$$\langle\tau\rangle = \tau_2 \cdot \frac{1 + \tau_2 \nu \cdot c_V}{1 + \tau_1 \nu \cdot c_V}$$

- Most numbers for point defects in metals and some other crystals were obtained by these two methods.

- There are many other methods, but always either limited to certain crystals, expensive, hard to evaluate, and so on.
- In essence, there are still no reliable and undisputed numbers for, e.g., the formation and migration enthalpies for vacancies (and interstitials) in **Si** or other semiconductors like **GaAs**.