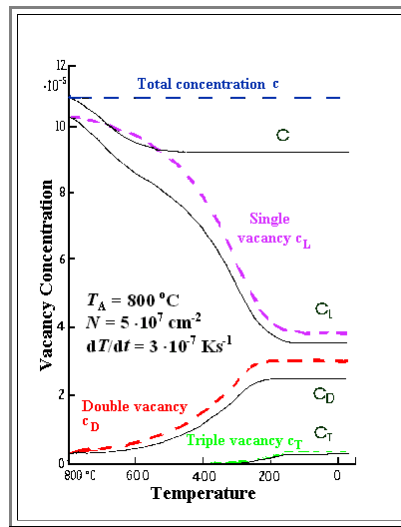


Calculated Vacancy Concentration After Quenching

Illustration

Calculated changes in the concentration of single- double- and triple vacancies (c_L , c_D and c_T) and the total concentration $c = c_L + 2c_D + 3c_T$ in Au during quenching from 800 °C with $dT/dt = 3 \cdot 10^4$ K/s (after Furuka).

- The colored dashed lines assume a dislocation density of zero (i.e. no sinks, $N = 0$), whereas the solid lines assume a dislocation density of $N = 5 \cdot 10^7$.



- Without sinks, the *total* concentration c of vacancies does not change is required (since no clusters with more than 3 vacancies are allowed). The concentration of single vacancies, however, changes considerably despite the large cooling rate.
- The presence of sinks does change the picture somewhat, but not dramatically as we would expect for large cooling rates - there simply is not enough time to migrate to a sink.
- For the migration energies ($E_{x,M}$) and the binding energies $E_{x,B}$ the following values were used: $E_{L,M} = 0.83 \text{ eV}$, $E_{D,M} = 0.71 \text{ eV}$, $E_{D,B} = 0.35 \text{ eV}$, $E_{T,B} = 0.65 \text{ eV}$.
- See also chapter 10.2 in the "[Physikalische Metallkunde](#)" of P. Haasen