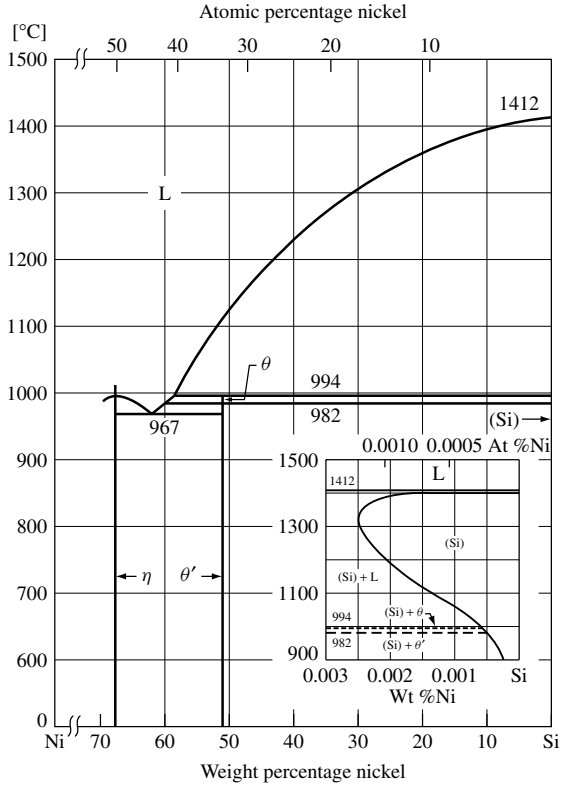

Figure 5.9 The Ni-Si phase diagram. The shape of the solidus line on the Si side is shown in the inserted window. It is seen that the solid solubility of Ni in Si is low, that it increases at temperatures above the peritectic point (at 994°C) (retrograde solubility) and reaches a maximum at about 1300°C. Redrawn from ASM Handbook, Vol. 8, *Metallography, Structures and Phase Diagrams* 8th Edition, ASM International, Materials Park, Ni-Si Phase Diagram, p. 325

minority-carrier capture cross-section. Therefore, the tolerable impurity concentration for acceptable lifetime values depends upon the chemical nature of the respective impurity, and its carrier capture cross-section for electrons in *p*-type silicon and for holes in *n*-type silicon. Both parameters can differ by orders of magnitude and consequently the acceptable concentration for a defined impurity can be quite different in *p*- and *n*-type silicon (Figures 5.11 and 5.12; [30]).

Copper and nickel have high diffusivities and low capture cross-sections. These elements will rapidly enter a low solid solution level after cooling to room temperature and may therefore be expected to have less effect on lifetime than elements with lower diffusivities (Fe, Ti) and high capture cross-sections.

5.6.3.5 Precipitates

Except for copper, which forms Cu_3Si particles when cooled, the other 3d metals form $MeSi_2$ precipitates. Investigations of crystallographic structure, morphology and