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Nd-Ni (Neodymium-Nickel)

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As reviewed by [1998Oka], the Nd-Ni phase diagram in [Massalski2] was updated by [1996Du] using a thermodynamic model and based on newer experimental data (dashed lines in Fig. 1). However, the calculated invariant reaction temperatures were generally a little too low in comparison with experimental data.

[2005Hua] reinvestigated the Nd-Ni system via experiments (differential scanning calorimetry and differential thermal analysis) and thermodynamic modeling. The result is shown with solid lines in Fig. 1. The diagrams of [1996Du] and [2005Hua] are similar, but the reaction temperatures in the latter are generally higher, in better agreement with experimental data.

[2005Hua] observed a thermal effect at 1171 °C for Nd_2Ni_7, which presumably corresponds to the transition from rhombohedral to hexagonal structure, as reported earlier by [1970Bus]. Nd-Ni crystal structure data including the information given above are shown in Table 1.

Nd_2Ni_{17} is stable only in a narrow temperature range from 1285 to 1282 °C [2005Hua].

Table 1 Nd-Ni crystal structure data

Phase	Composition, at.% Ni	Pearson symbol	Space group	Strukturbericht designation	Prototype
(βNd)	0	*cI*2	$Im\bar{3}m$	*A*2	W
(αNd)	0	*hP*4	$P6_3/mmc$	*A*3′	αLa
Nd_3Ni	25	*oP*16	*Pnma*	$D0_{11}$	Fe_3C
Nd_7Ni_3	30	*hP*20	$P6_3/mc$	$D10_2$	Fe_3Th_7
NdNi	50	*oC*8	*Cmcm*	B_f	CrB
$NdNi_2$	66.7	*cF*24	$Fd\bar{3}m$	*C*15	Cu_2Mg
$NdNi_3$	75	*hR*12	$R\bar{3}m$	…	Be_3Nb
βNd_2Ni_7	77.8	*hR*18	$R\bar{3}m$	…	Co_7Er_2
αNd_2Ni_7	77.8	*hP*36	$P6_3/mmc$	…	Ce_2Ni_7
$NdNi_5$	83.3	*hP*6	*P6/mmm*	$D2_d$	$CaCu_5$
Nd_2Ni_{17}	89.5	*hP*38	$P6_3/mmc$	…	Th_2Ni_{17}
(Ni)	100	*cF*4	$Fm\bar{3}m$	*A*1	Cu

References

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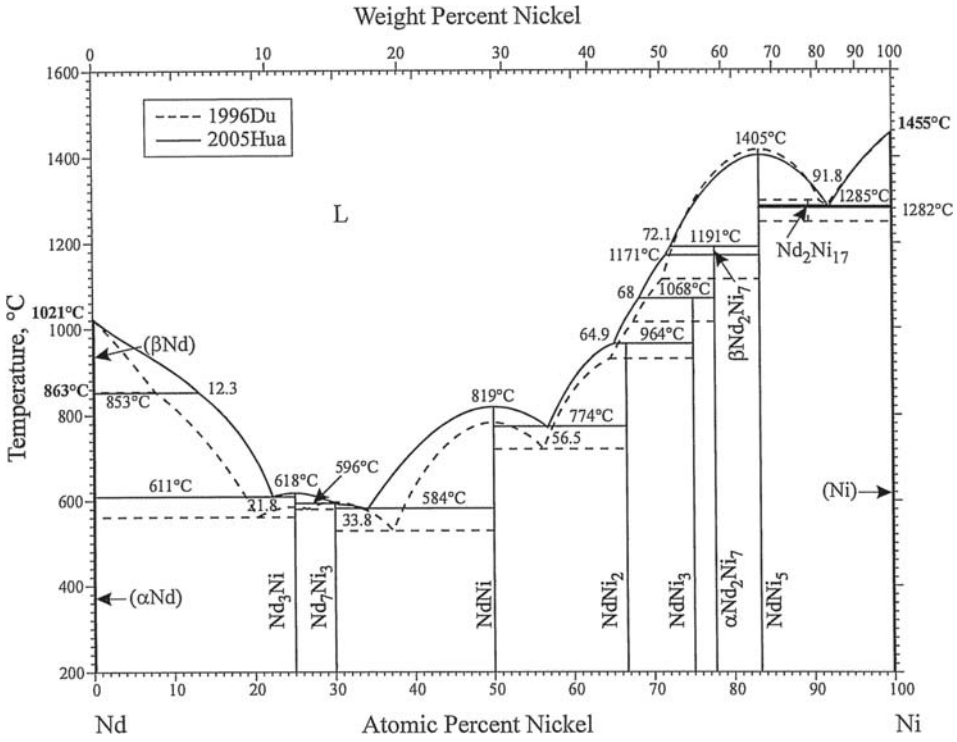

Fig. 1 Nd-Ni phase diagram