

ARTICLE

Supplementary data

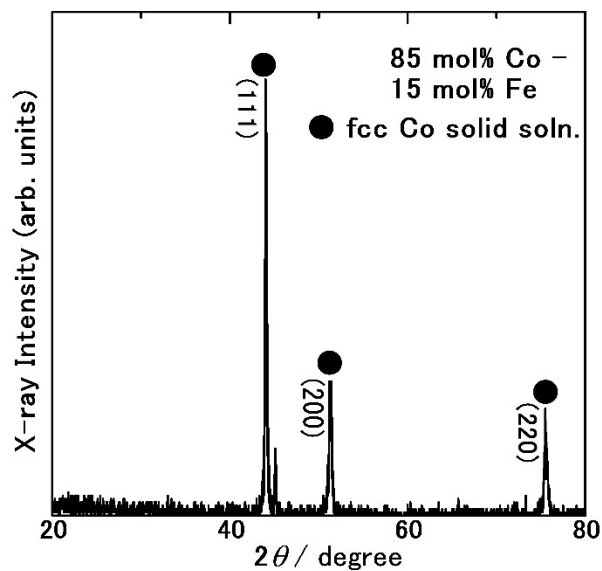


Fig.S-1 XRD pattern of 85 mol% Co – 15 mol% Fe sample composed of fcc Co solid solution.<sup>47</sup>

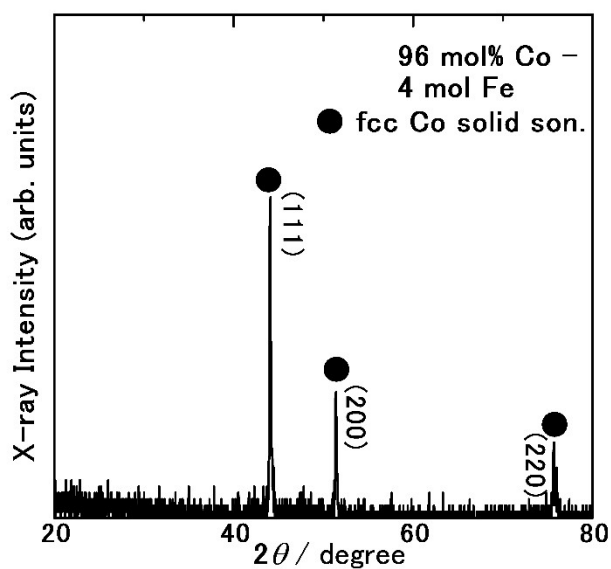


Fig.S-2 XRD pattern of 96 mol% Co – 4 mol% Fe sample composed of fcc Co solid solution.<sup>47</sup>

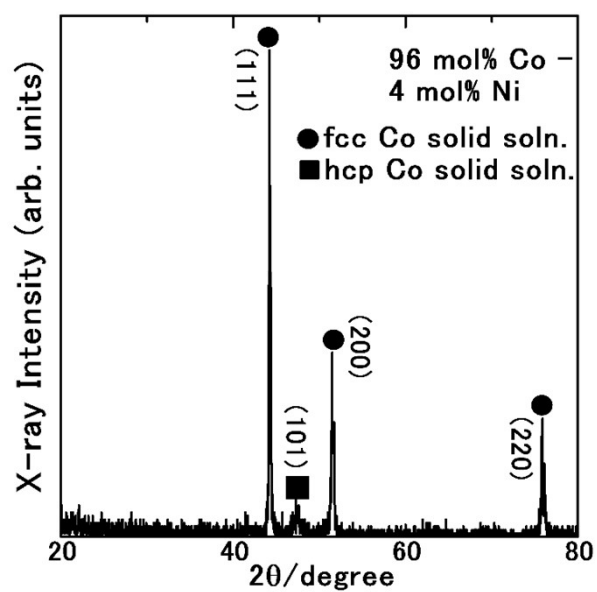


Fig.S-3 XRD pattern of 96 mol% Co – 4 mol% Fe sample composed of fcc Co solid solution.<sup>47</sup>

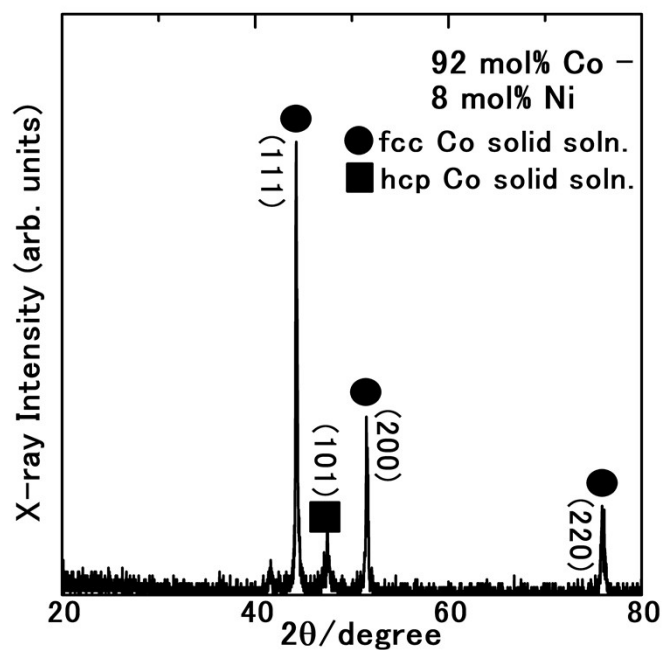


Fig.S-4 XRD pattern of 92 mol% Co – 8 mol% Ni sample composed of fcc<sup>47</sup> and hcp<sup>48</sup> Co solid solutions.

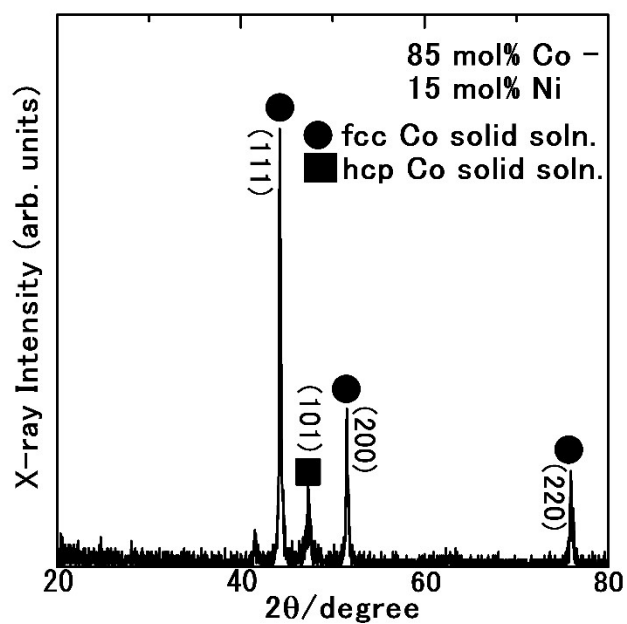


Fig.S-5 XRD pattern of 85 mol% Co – 15 mol% Ni sample composed of fcc<sup>47</sup> and hcp<sup>48</sup> Co solid solutions.

Table S1 Summary of the thermodynamic values at 298.15 K and their uncertainties,  $U$ , of the substances of interest.

Substances	$\Delta_f H_m^\circ$ / (kJ (mol of compd.) <sup>-1</sup> )	$U(\Delta_f H_m^\circ)$ / (kJ (mol of compd.) <sup>-1</sup> )	$S_m^\circ$ / (J K <sup>-1</sup> (mol of compd.) <sup>-1</sup> )	$U(S_m^\circ)$ / (J K <sup>-1</sup> (mol of compd.) <sup>-1</sup> )	$\Delta_f G_m^\circ$ / (kJ (mol of compd.) <sup>-1</sup> )	$U(\Delta_f G_m^\circ)$ / (kJ (mol of compd.) <sup>-1</sup> )	Refs.
NH <sub>3</sub> BH <sub>3</sub> (cr)	-178.0	± 5.9	unknown	-	unknown	-	(37)
NH <sub>3</sub> (aq)	-81.170	± 0.326	109.040	± 0.913	-26.673	± 0.305	(49)
NH <sup>4+</sup> (aq)	-133.260	± 0.250	111.170	± 0.400	-79.398	± 0.278	(49)
B(OH) <sub>3</sub> (aq)	-1072.800	± 0.800	162.400	± 0.600	-969.268	± 0.820	(49)
BO <sub>2</sub> <sup>-</sup> (aq)	-772.37	± 0.56 <sup>*2</sup>	-37.2	± 0.25 <sup>*2</sup>	-678.89	± 0.57 <sup>a</sup>	(50)
H <sub>2</sub> O(l)	-285.830	± 0.040	69.950	± 0.030	-237.140	± 0.041	(49)
H <sub>2</sub> (g)	0.000	± 0.000	130.680	± 0.003	0.000	± 0.000	(49)

<sup>a</sup> Uncertainties of BO<sub>2</sub><sup>-</sup>(aq) were estimated to be equal to those of B(OH)<sub>3</sub>(aq).