Supplementary Information for:

The Equilibrium Potentials of Ni-Ln alloys over the whole Composition Range in Phase Diagram– Experiment and Prediction

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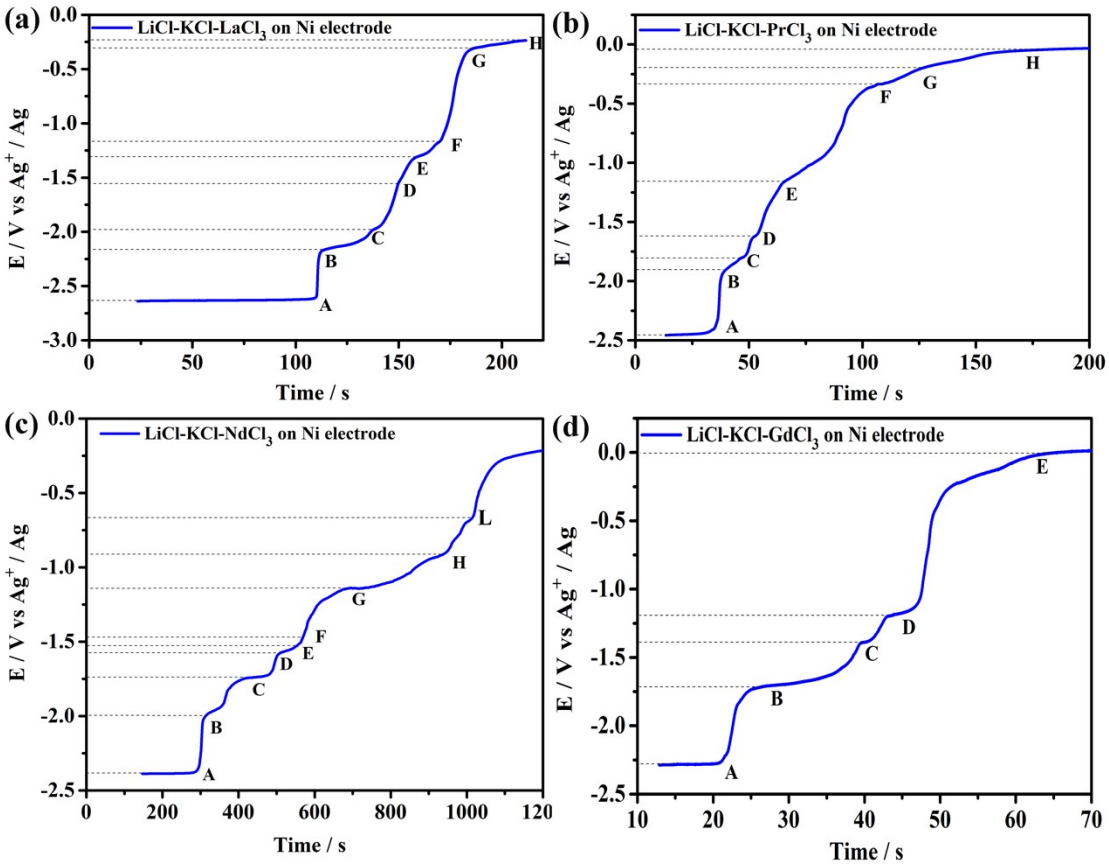

Fig. S1 (a) Open circuit chronopotentiometry curves obtained on a Ni electrode after potentiostatic electrolysis at -2.5 V (vs. Ag/Ag^+) for 10 s in LiCl-KCl-$LaCl_3$ (2.0 wt.%) melt. Temperature: 873

K. (b) Open circuit chronopotentiometry curves obtained on a Ni electrode after potentiostatic electrolysis at -2.5 V (vs. Ag/Ag^{+}) for 10 s in LiCl-KCl-$PrCl_3$ (2.0 wt.%) melt. Temperature: 873 K. (c) Open circuit chronopotentiometry curves obtained on a Ni electrode after potentiostatic electrolysis at -2.5 V (vs. Ag/Ag^{+}) for 10 s in LiCl-KCl-$NdCl_3$ (2.0 wt.%) melt. Temperature: 873 K. (d) Open circuit chronopotentiometry curves obtained on a Ni electrode after potentiostatic electrolysis at -2.5 V (vs. Ag/Ag^{+}) for 10 s in LiCl-KCl-$GdCl_3$ (2.0 wt.%) melt. Temperature: 873 K.

Table S1 Summarizes the relationship between the types of alloy compounds with different La atom percentages and the equilibrium potential.

773K	La	La_3Ni	La_7Ni_3	LaNi	La_2Ni_3	$LaNi_2$	$LaNi_5$
Composition/%	100	75	70	50	40	33.3	16.8
Experimental value /V	-2.633	-2.16	-1.978	-1.554	-1.307	-1.165	-0.305

Table S2 Summarizes the relationship between the types of alloy compounds with different Nd atom percentages and the equilibrium potential.

773K	Nd	Nd_7Ni_3	NdNi	$NdNi_2$	$NdNi_3$	Nd_2Ni_7	$NdNi_5$	Nd_2Ni_{17}
Composition/%	100	70	50	33.3	25	22.2	16.66	10.526
Experimental value /V	-1.951	-1.737	-1.6	-1.36	-1.256	-1.125	-0.892	-0.684

Table S3 Summarizes the relationship between the types of alloy compounds with different Pr atom percentages and the equilibrium potential.

773K	Pr	Pr_3Ni	Pr_7Ni_3	PrNi	Pr_2Ni_7	$PrNi_5$
Composition/%	100	75	70	50	22.3	16.8

Experimental value /V	-2.449	-1.941	-1.804	-1.619	-0.332	-0.2

Table S4 Summarizes the relationship between the types of alloy compounds with different Gd atom percentages and the equilibrium potential.

773K	Gd	Gd_3Ni	Gd_3Ni_2	GdNi	Gd_2Ni_7
Composition/%	100	75	60	50	22.3
Experimental value /V	-2.276	-1.71	-1.385	-1.196	-0.12