Supplementary Information

Phase transformation and cycling characteristic of Ce_2Ni_7-type single-phase $La_{0.78}Mg_{0.22}Ni_{3.45}$ metal hydride alloy

Lu Zhang,[a,b] Yuan Li,[a,b] Xin Zhao,[c] Jingjing Liu,[a,b] Dandan Ke,[a,b] Wenkai Du,[a,b] Shuqin Yang[a,b] and Shumin Han*[a,b]

[a] State Key Laboratory of Metastable Materials Science and Technology, Yanshan University, Qinhuangdao 066004, PR China

[b] Hebei Key Laboratory of Applied Chemistry, School of Environmental and Chemical Engineering, Yanshan University, Qinhuangdao 066004, PR China

[c] Baotou Research Institute of Rare Earth, Baotou 014030, PR China

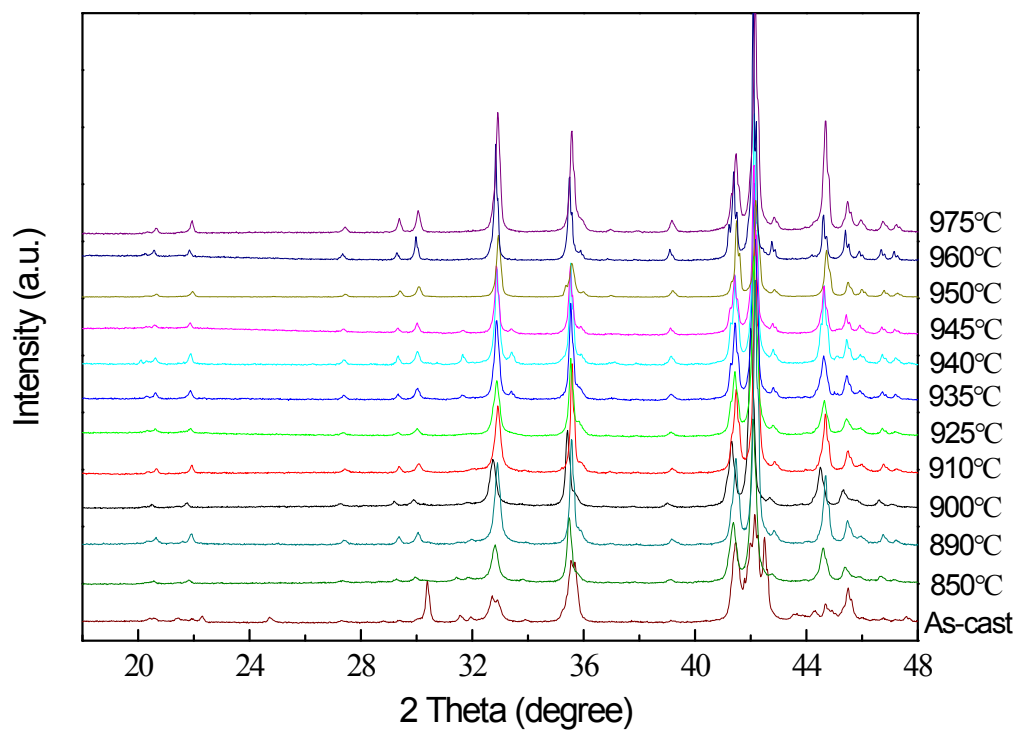❖ XRD patterns of the as-cast and all the annealed alloys

Fig. S1 Evolution of the XRD patterns in the 2θ range of 18–48° for the as-cast and alloys annealed at 850–975 ˚C.

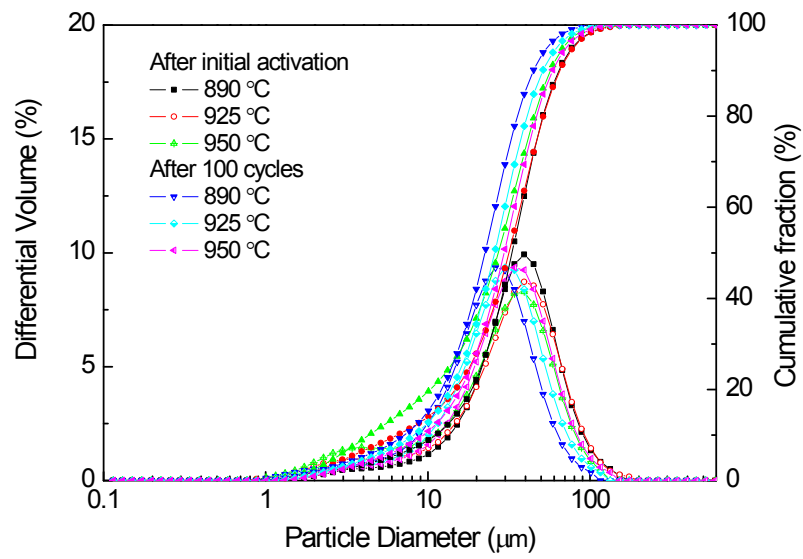❖ Particle size distribution of three groups of the annealed alloys

Fig. S2 Particle size distribution of the alloys annealed at 890, 945, and 950 ˚C for initial activation and with 100 charge-discharge cycles.
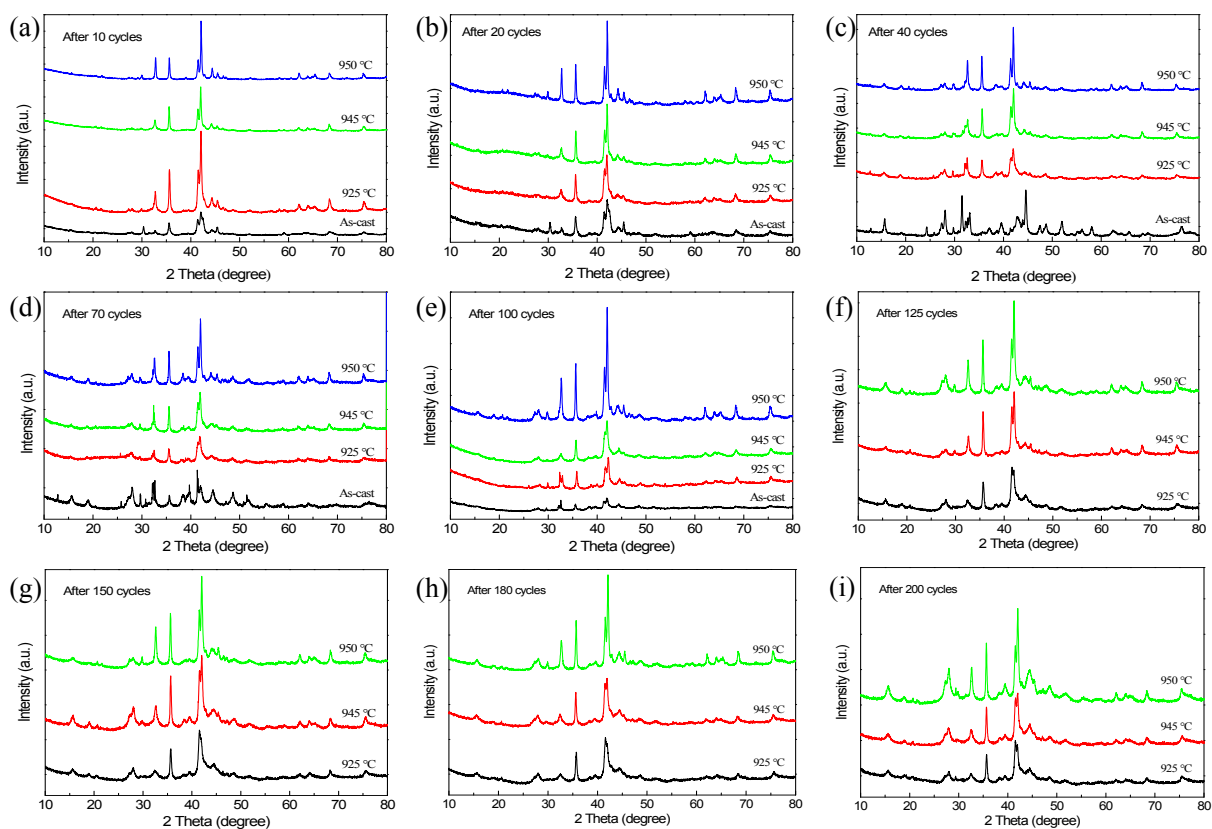
❖ XRD patterns of all the corroded alloys

Fig. S3 XRD patterns of the as-cast and the alloys annealed at 925, 945, and 950 ˚C with 10 (a), 20 (b), 40 (c), 70 (d), 100 (e), 125 (f), 150 (g), 180 (h) and 200 (i) charge-discharge cycles.

Table S1 Electronic diffraction analysis on the alloy annealed at 950 ˚**C** with 100 charge-discharge cycles: comparison between experimental values of interplanar distances and PDF database of La(OH)$_3$, Ni and LaNi$_5$

1/d	d (nm) measured with DiffTool	Relative Intensity	Distance in La(OH)$_3$ PDF n°00-036-1481	Distance in Ni PDF n°00-065-0380	Distance in LaNi$_5$ PDF n°00-065-1107
3.1319	0.319	100.00	0.3182	–	–
4.8497	0.206	100.00	–	0.2041	–
3.3738	0.296	100.00	–	–	0.2937
9.3284	0.107	4.50	–	–	0.1033