

Supplementary Information

Hydrogen absorption–desorption characteristics of a Gd_2Co_7 -type $\text{Sm}_{1.6}\text{Mg}_{0.4}\text{Ni}_7$ compound

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❖ Hydrogen desorption kinetic curves

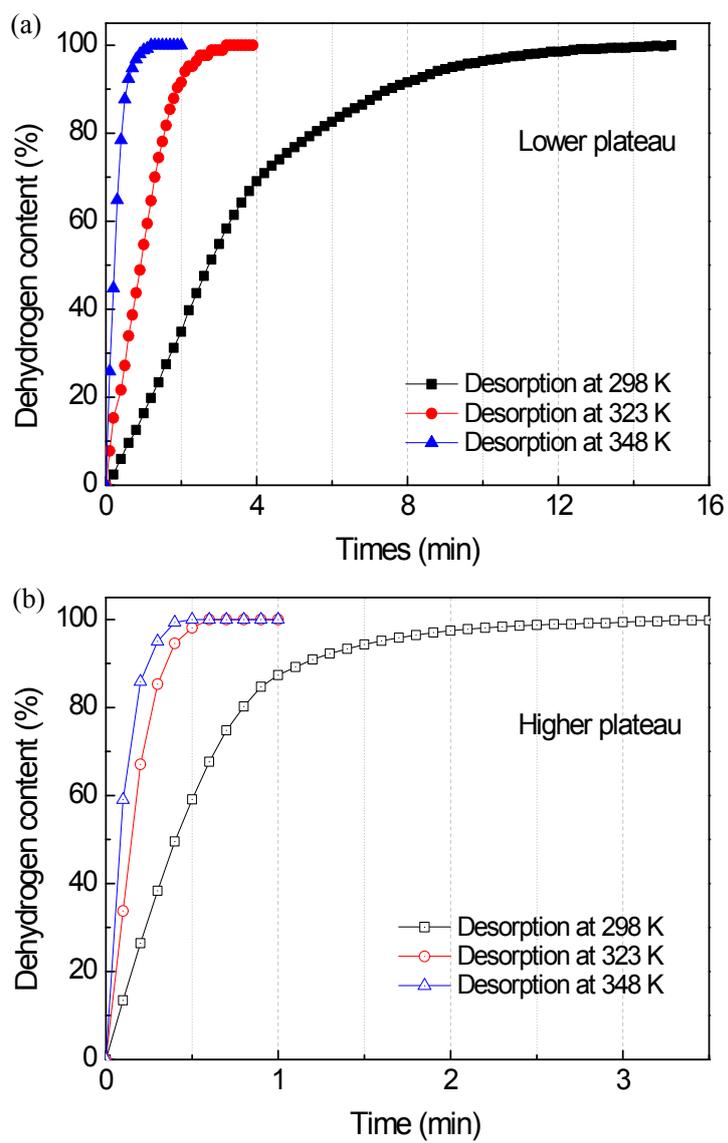


Fig. S1 Hydrogen desorption kinetic curves for the $\text{Sm}_{1.6}\text{Mg}_{0.4}\text{Ni}_7$ compound across the lower and higher plateaus measured in the range of 298–348 K.

❖ Rietveld refinements of the $\text{Sm}_{1.6}\text{Mg}_{0.4}\text{Ni}_7$ compound during hydrogenated process

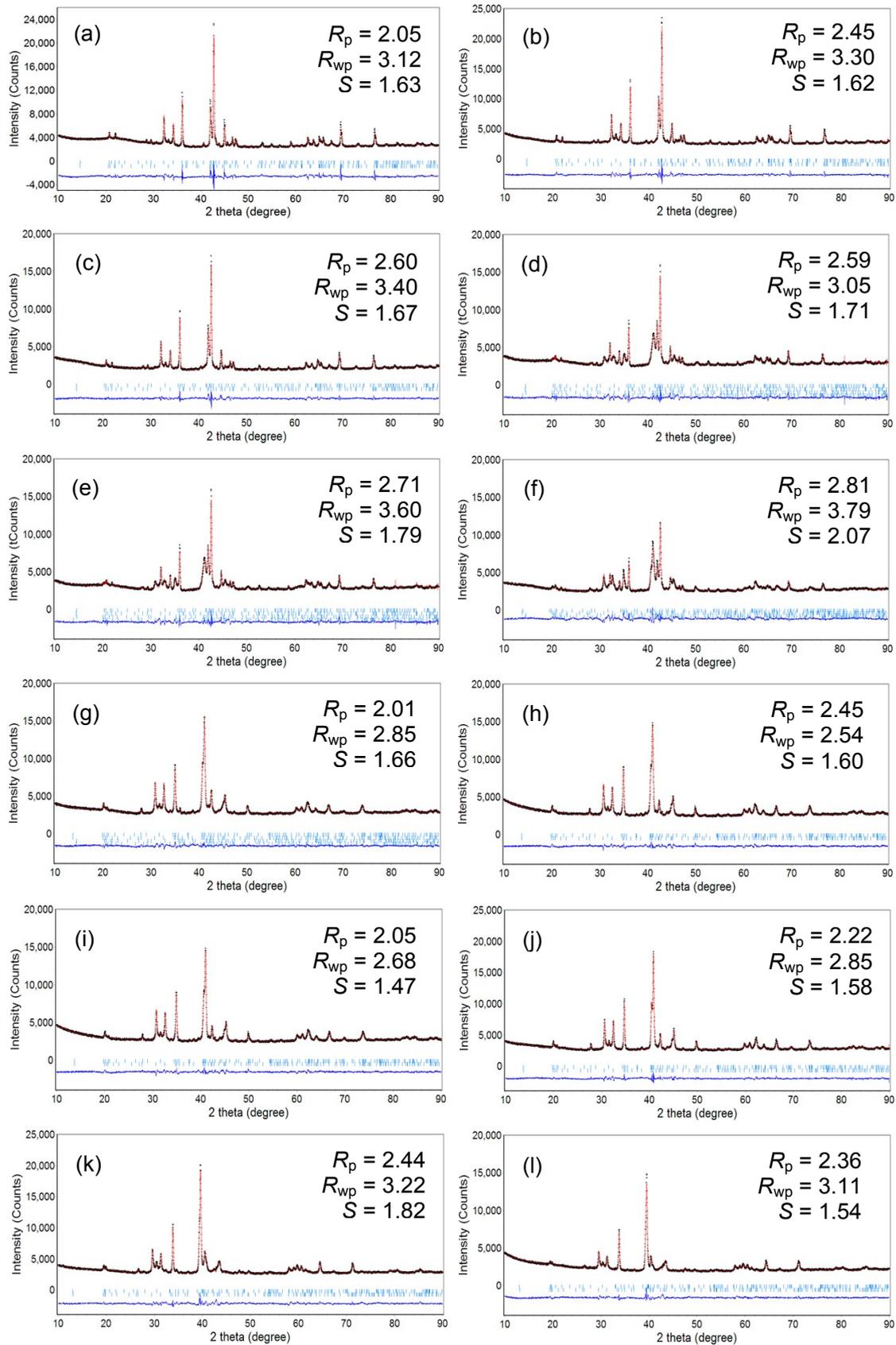


Fig. S2 Rietveld refinements of the $\text{Sm}_{1.6}\text{Mg}_{0.4}\text{Ni}_7$ compound during hydrogenated process: (a) Original, (b) 0.06 wt.%, (c) 0.10 wt.%, (d) 0.31 wt.%, (e) 0.41 wt.%, (f) 0.52 wt.%, (g) 0.71 wt.%, (h) 0.82 wt.%, (i) 0.92 wt.%, (j) 1.34 wt.%, (k) 1.70 wt.% and (l) 1.88 wt.%. Vertical bars below the patterns show the positions of all possible reflection peaks of the Ce_2Ni_7 -type (2H) and Gd_2Co_7 -type (3R) solid solution (SS) phases for (a–c); 2H-SS, 3R-SS, 2H-hydride (H) and 3R-H phases for (d–g); and 2H-H and 3R-H phases for (h–l).

Rietveld refinements of the $\text{Sm}_{1.6}\text{Mg}_{0.4}\text{Ni}_7$ compound during dehydrogenated process

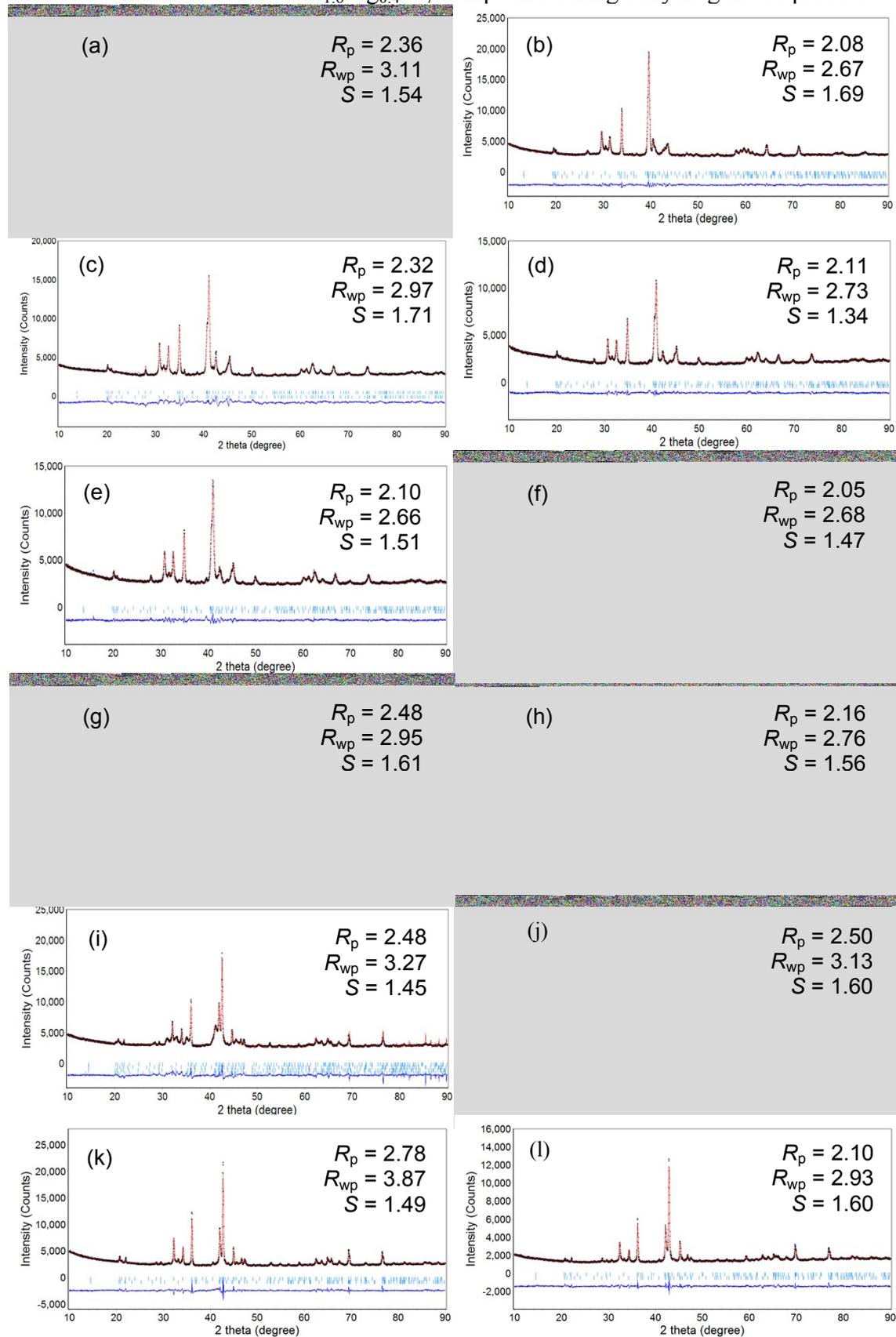


Fig. S3 Rietveld refinements of the $\text{Sm}_{1.6}\text{Mg}_{0.4}\text{Ni}_7$ compound during dehydrogenated process: (a) 1.88 wt.%, (b) 1.62 wt.%, (c) 1.45 wt.%, (d) 1.15 wt.%, (e) 1.03 wt.%, (f) 0.92 wt.%, (g) 0.68 wt.%, (h) 0.60 wt.%, (i) 0.48 wt.%, (j) 0.21 wt.%, (k) 0.15 wt.% and (l) Original. Vertical bars below the patterns show the positions of all possible reflection peaks of the 2H-H and 3R-H phases for (a–f); 2H-H, 3R-H and 2H-SS, 3R-SS phases for (g–i); and 2H-SS and 3R-SS phases for (j–l).