Supplementary information

Heat charge and discharge performance, mechanisms, and reversibility of the coupled $LaNi_5$-$La_{0.6}Ce_{0.4}Ni_5$

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1. Dehydrogenation kinetics

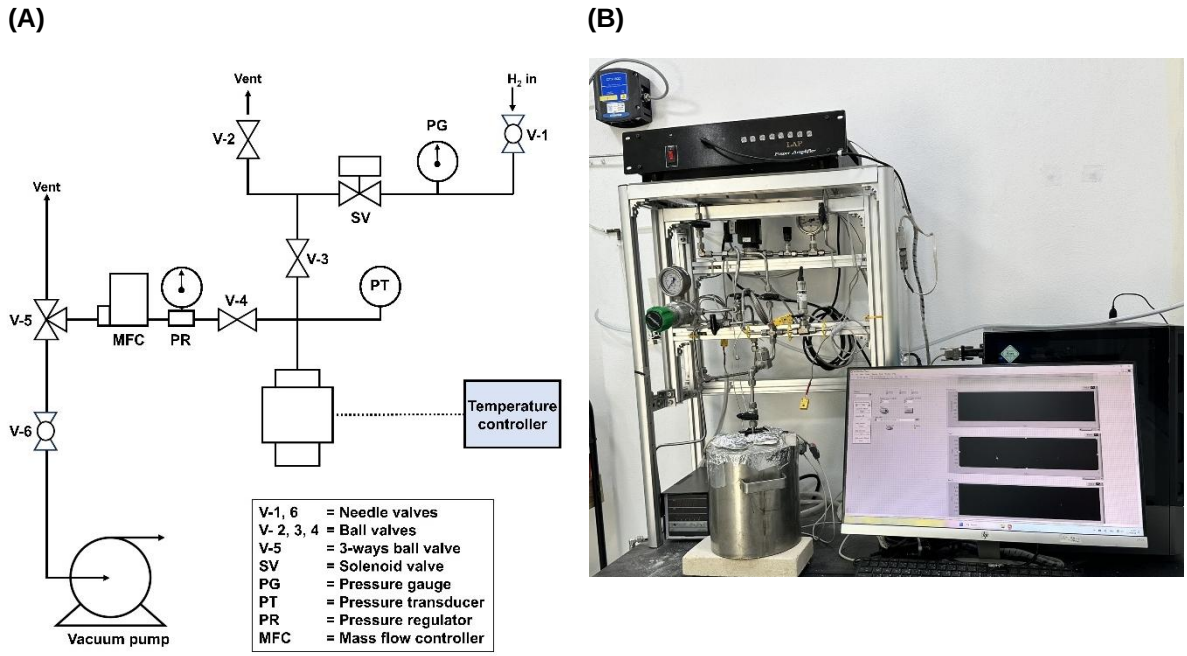

Figure S1. Schematic diagram (A) and photo (B) of the test station for dehydrogenation kinetic and hydrogen storage capacity.

2. Pressure-composition-isotherms (PCI)

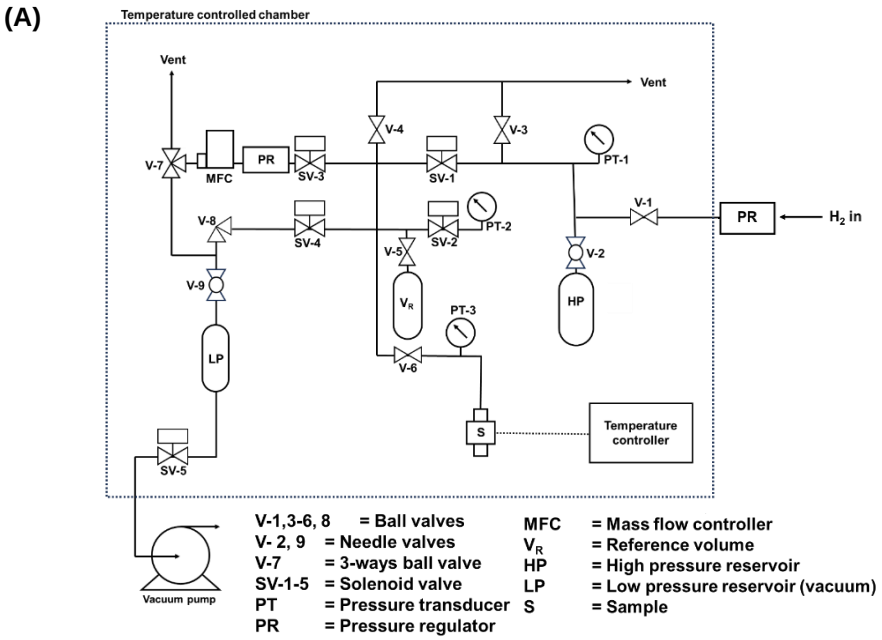

Figure S2. Schematic diagram (A) and photo (B) of pressure-composition-isotherm (PCI) test station.

3. Structural refinements

To investigate the unit cell parameters and volumes, the La Bail structural refinements using TOPAS software were carried out. Prior to the refinement, the diffraction peak of sample holder at 2θ~52º is subtracted. From the refinement results, R_{exp}, R_{wp}, and GOF in the ranges of 1.68-2.44, 2.50-4.70, and 1.07-1.95, respectively, are obtained. The obtained lattice parameters and unit cell volumes of as-received samples of $LaNi_5$ and $La_{0.6}Ce_{0.4}Ni_5$ as well as HTH and LTH in the as-prepared state and after cycling (Figures S3).

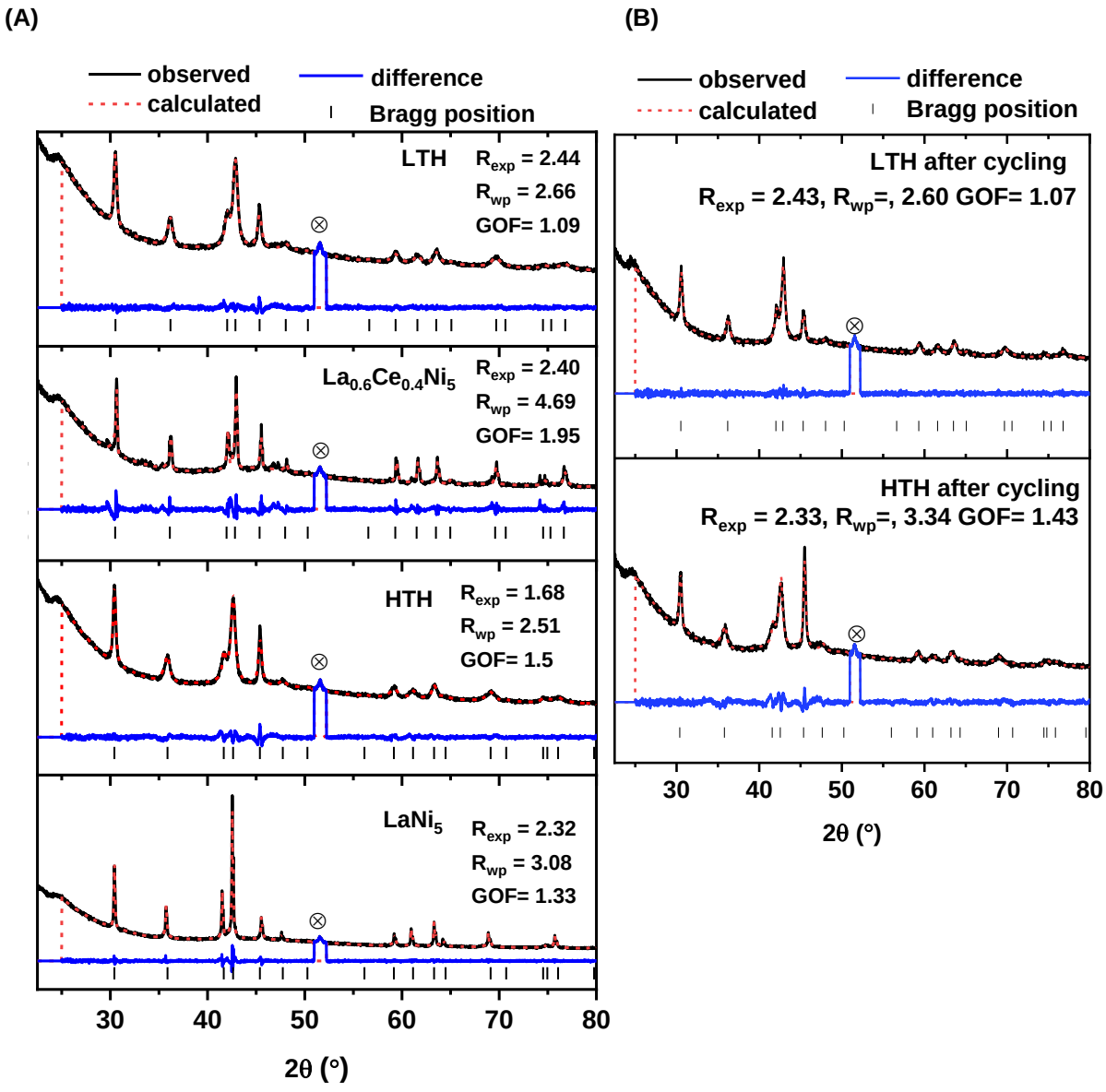

Figure S3. Le Bail structural refinements of as-received samples of $LaNi_5$ and $La_{0.6}Ce_{0.4}Ni_5$ as well as as-prepared HTH and LTH (A) and HTH and LTH and after cycling (B).