

Supporting Information

Synthesis of the LaNi₅/LaOCl

La-Ni-O oxide precursor is synthesized as described in the main text, 1.20 g precursor was mixed with 2.0 g LiCl-KCl (molar ratio 1:1) and 0.50 g CaH₂, then heated at 700 °C for 2 h under Ar protection (flow rate 70 sccm). The calcined mixture was washed with 0.100 mol/L acetic acid under Ar protection, and the final products were obtained after centrifugation, washing, and vacuum drying.

Supporting Figures

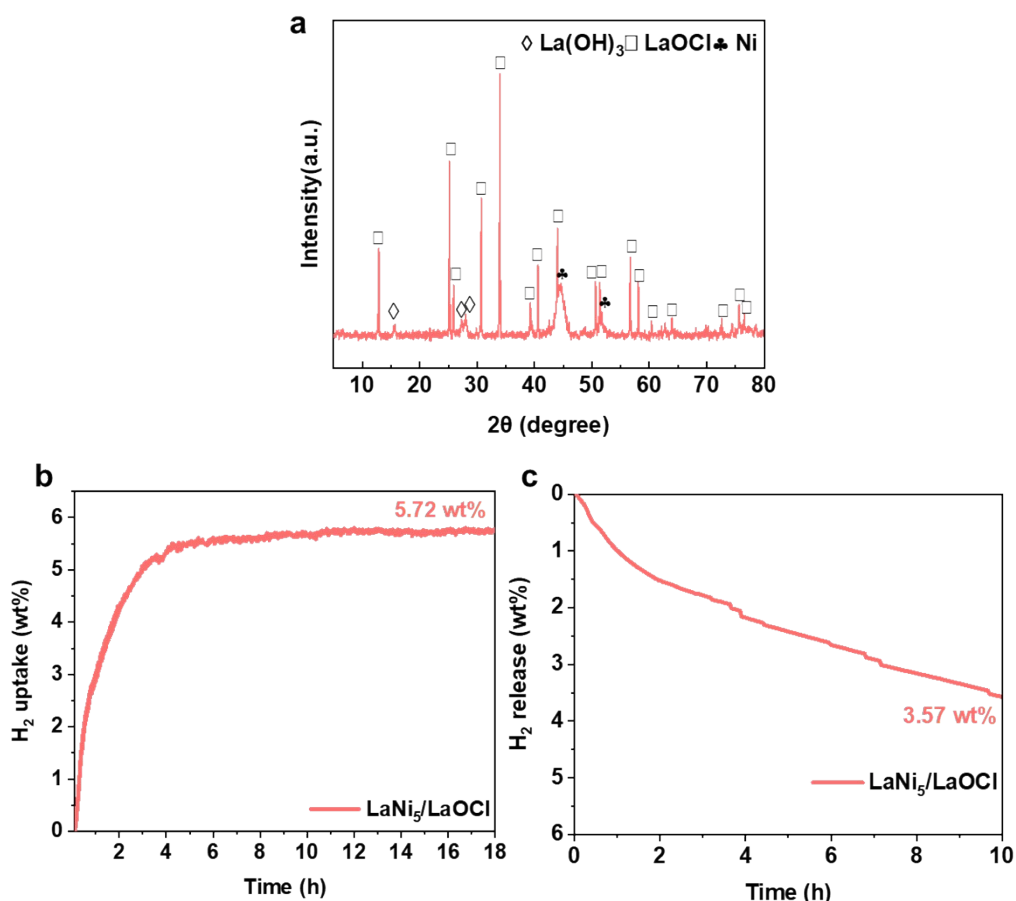


Figure S1 (a) XRD of LaNi₅/LaOCl, (b) NEC hydrogenation kinetics, and (c) 12H-NEC dehydrogenation kinetics under the catalysis of LaNi₅/LaOCl

(Hydrogenation and dehydrogenation reactions are carried out at 180 °C, 7 MPa H₂, and 200 °C, 0.1 MPa H₂ respectively, the catalyst loading is 10 wt%).

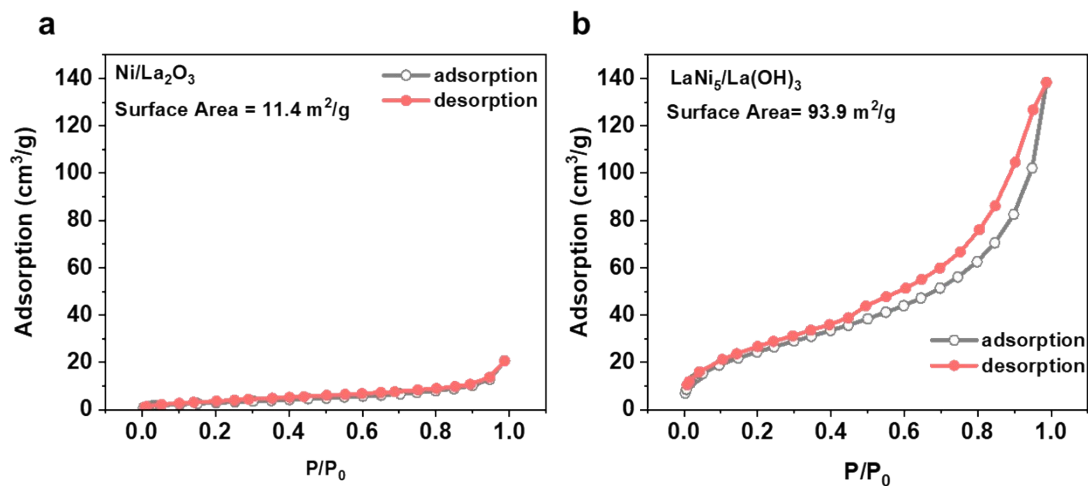


Figure S2 N₂ adsorption and desorption isotherms of Ni/La₂O₃ and LaNi₅/La(OH)₃.

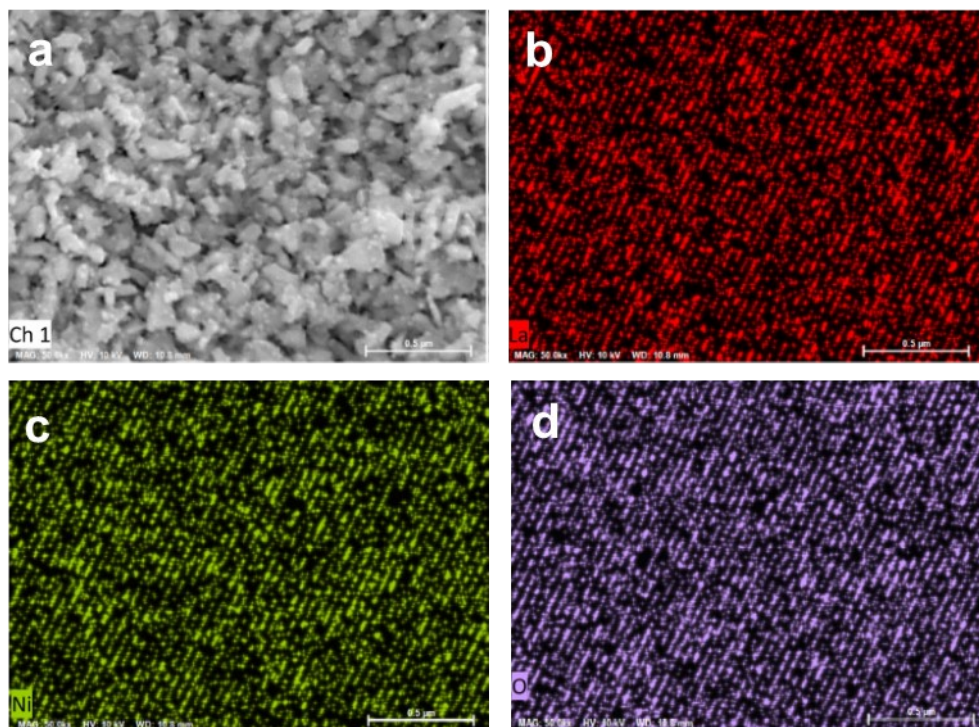


Figure S3 EDS mapping under SEM of elements La, Ni, and O in Ni/La₂O₃

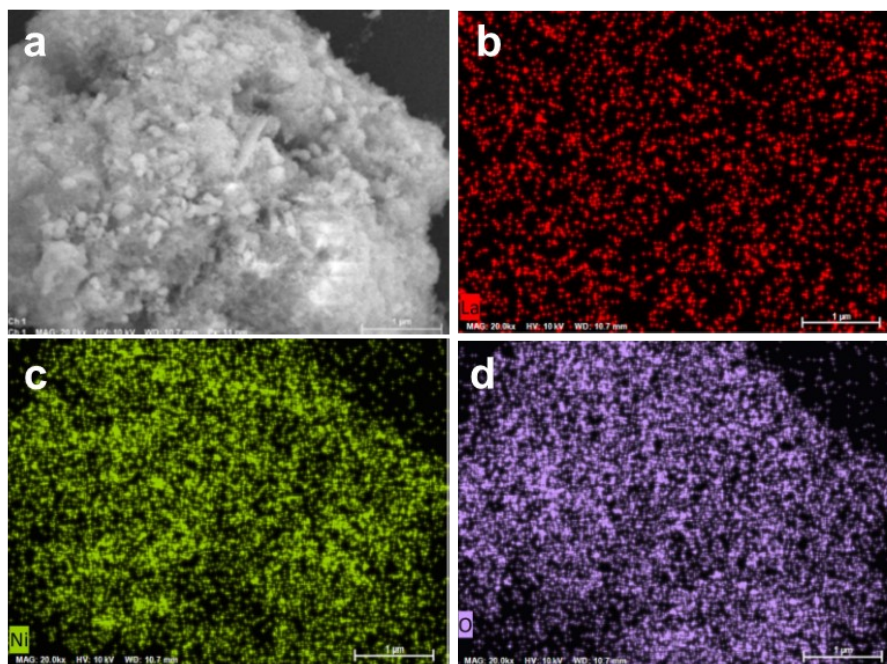


Figure S4 EDS mapping under SEM of elements La, Ni, and O in $\text{LaNi}_5/\text{La}(\text{OH})_3$

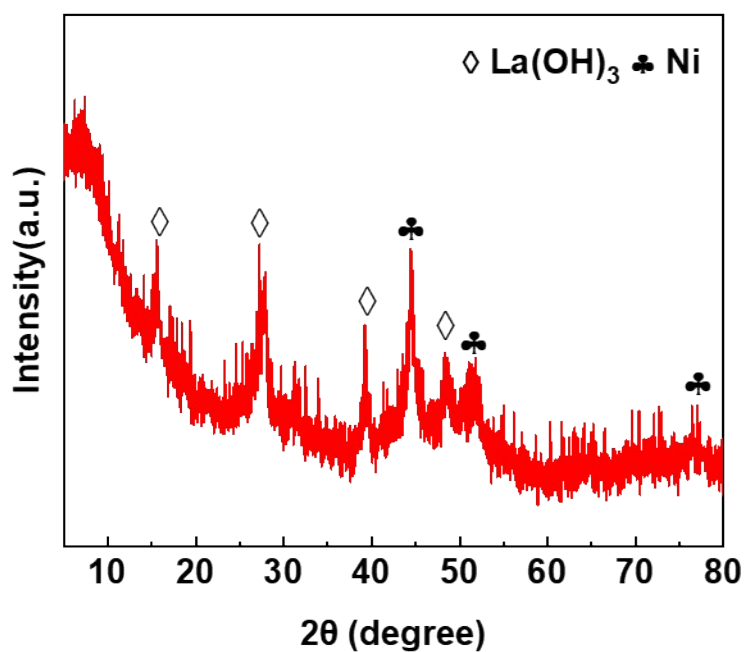


Figure S5 XRD of $\text{LaNi}_5/\text{La}(\text{OH})_3$ after 1 catalytical hydrogenation-dehydrogenation reaction cycle