Electronic Supplementary Information

A solid-state synthetic strategy toward nickel-based bimetallic interstitial compounds (MNi_3C_x, M = Zn, In, Ga)

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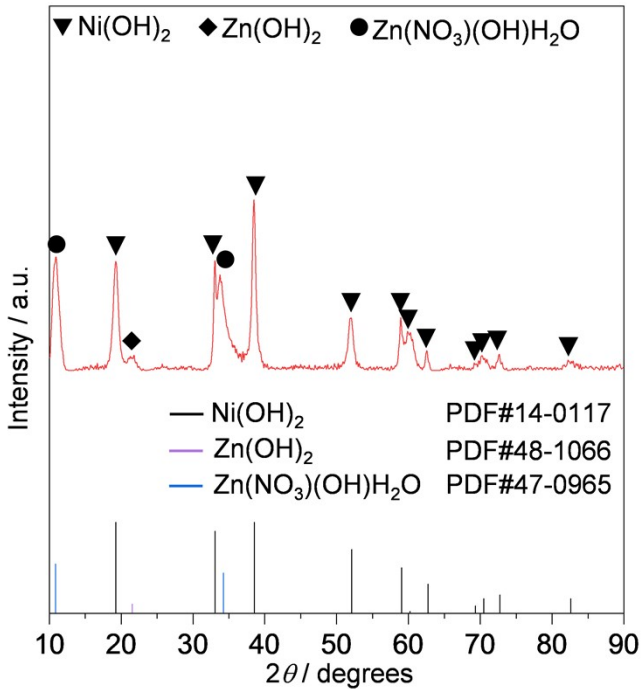


Fig. S1. The PXRD pattern of the as-prepared Ni-Zn precipitate from the co-precipitation method. Vertical lines are the reference standards.

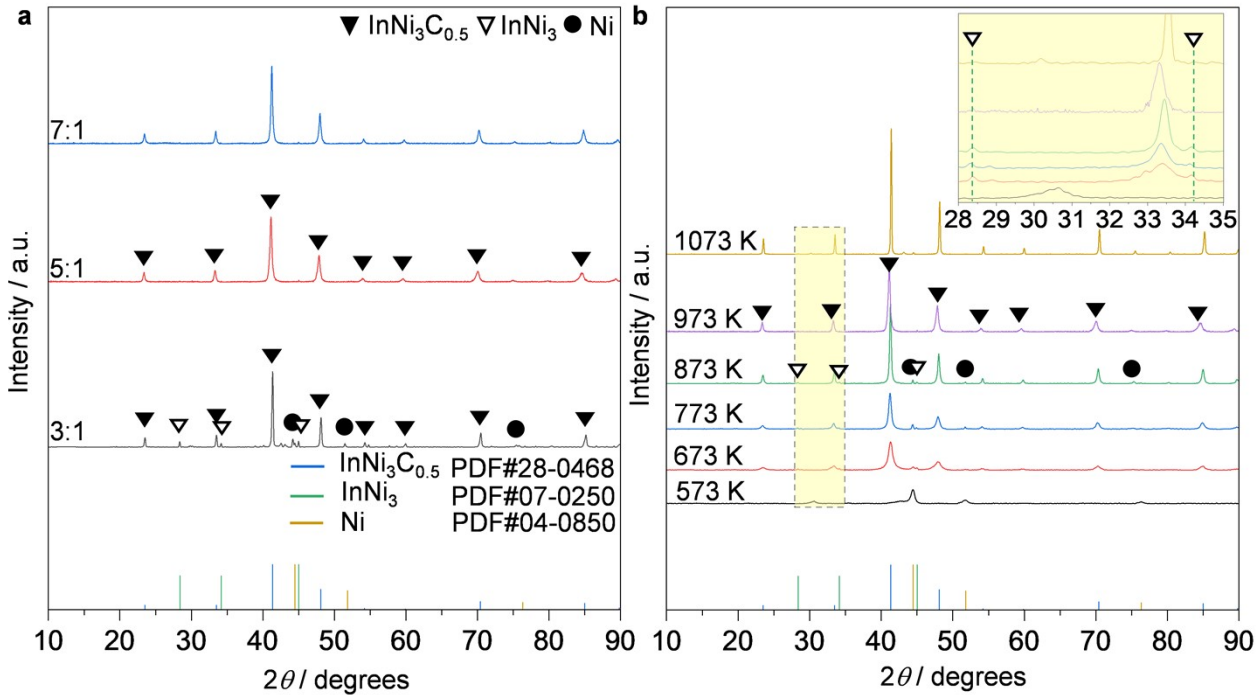


Fig. S2. The PXRD patterns of products synthesized by the solid-state reaction between the metal hydroxides of Ni and In, and melamine under different synthetic parameters: **a**, Weight ratios of melamine:Ni-In precursors = 3:1-7:1, 973 K, 4 h in H_2, **b**. Annealing temperatures of 573-1073 K, weight ratios of melamine:Ni-In precursors = 5:1, 4 h in H_2. Inset in **b** shows the zoom in at 28-35° 2θ. Vertical lines are the reference standards.

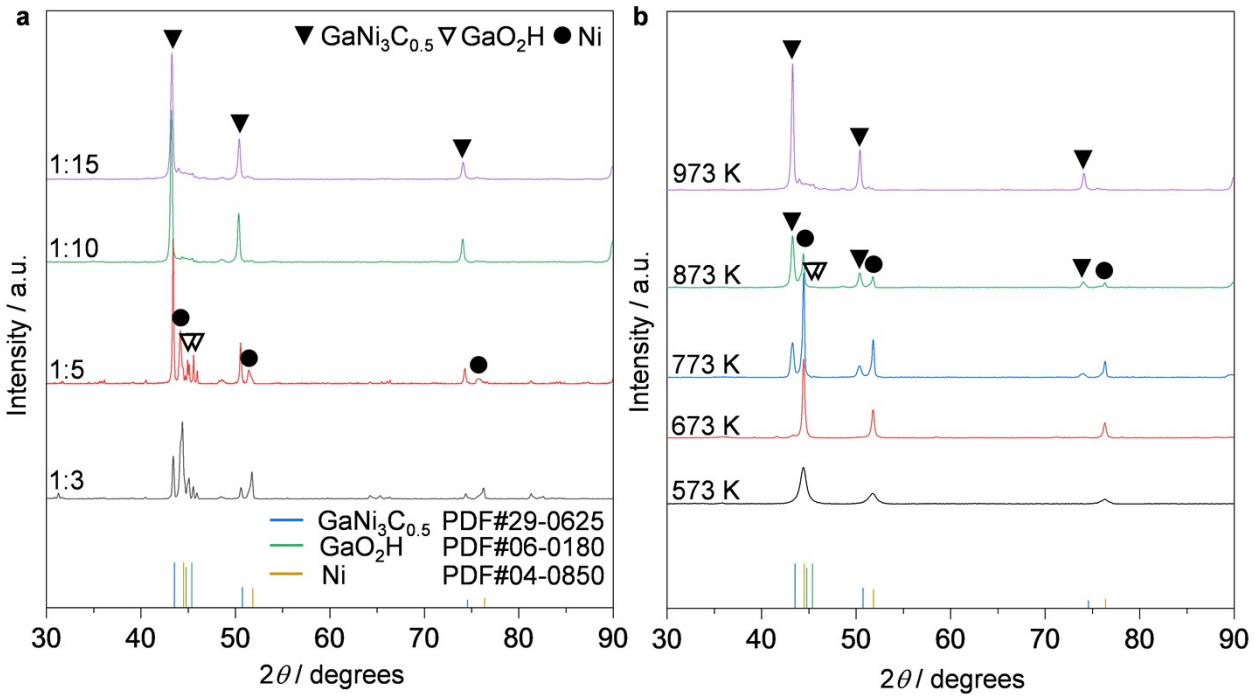


Fig. S3. The PXRD patterns of products synthesized by the solid-state reaction between the metal hydroxides of Ni and Ga, and melamine under different synthetic parameters: **a**, Weight ratios of melamine:Ni-Ga precursors = 3:1-15:1, 973 K, 4 h in H_2, **b**. Annealing temperatures of 573-973 K, weight ratios of melamine:Ni-In precursors = 15:1, 4 h in H_2. Vertical lines are the reference standards.

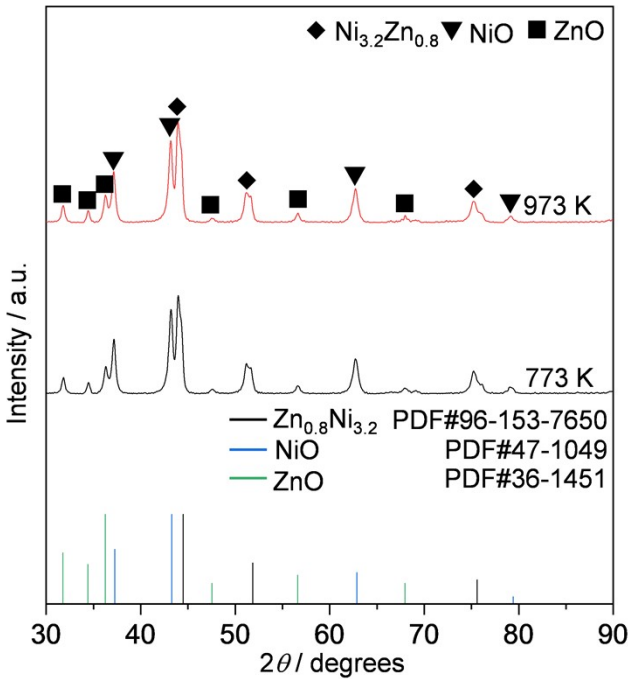
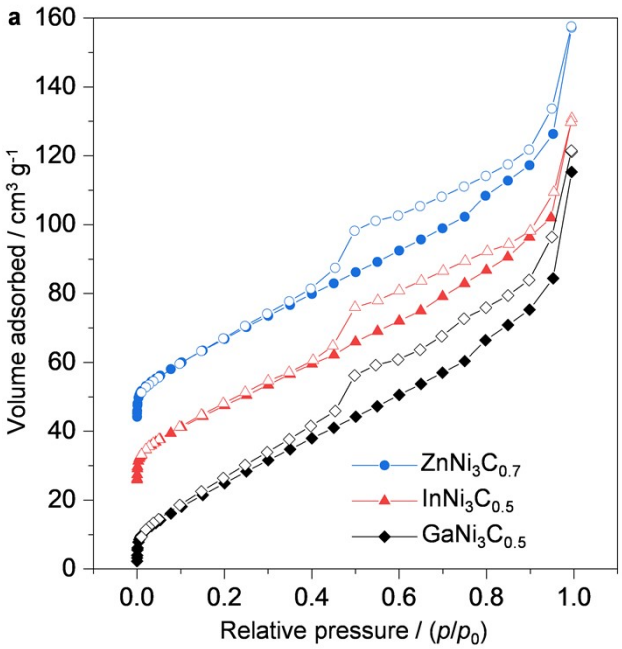


Fig. S4. The PXRD patterns of products synthesized by annealing the co-precipitation-derived precursors in H_2 for 4 h at 773 and 973 K. Vertical lines are the reference standards.

a



b

Samples	V_{total}/ (cm^3g^{-1})	S_{BET}/ (m^2g^{-1})
$ZnNi_3C_{0.7}$	0.15	63.3
$InNi_3C_{0.5}$	0.14	65.2
$GaNi_3C_{0.5}$	0.14	64.2

Fig. S5. a, The N_2 sorption isotherms of the developed catalysts and **b**, the key porosity parameters.

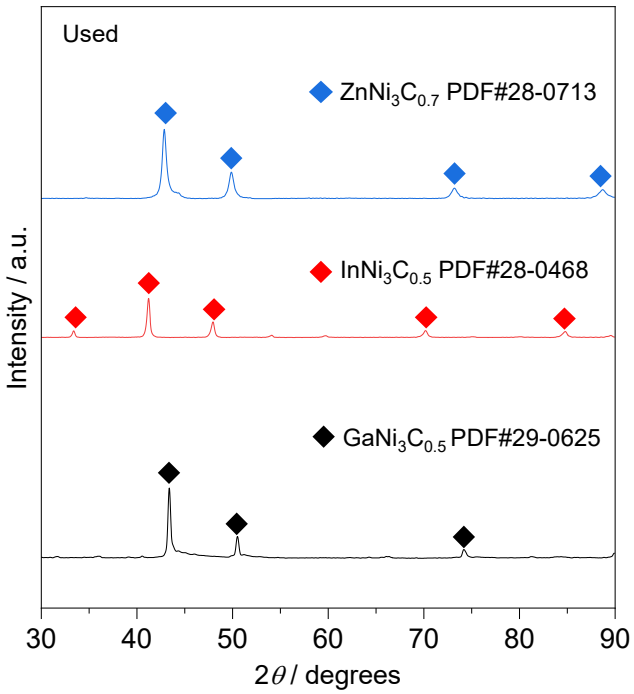


Fig. S6. The PXRD patterns of the catalysts after the testing in DMO hydrogenation.

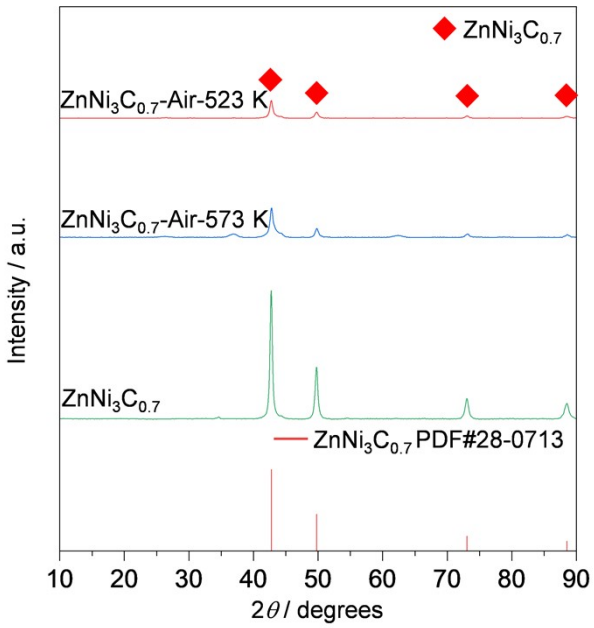


Fig. S7. The PXRD patterns of the as-prepared $ZnNi_3C_{0.7}$ and after oxidation in air at different temperatures for 3 h.

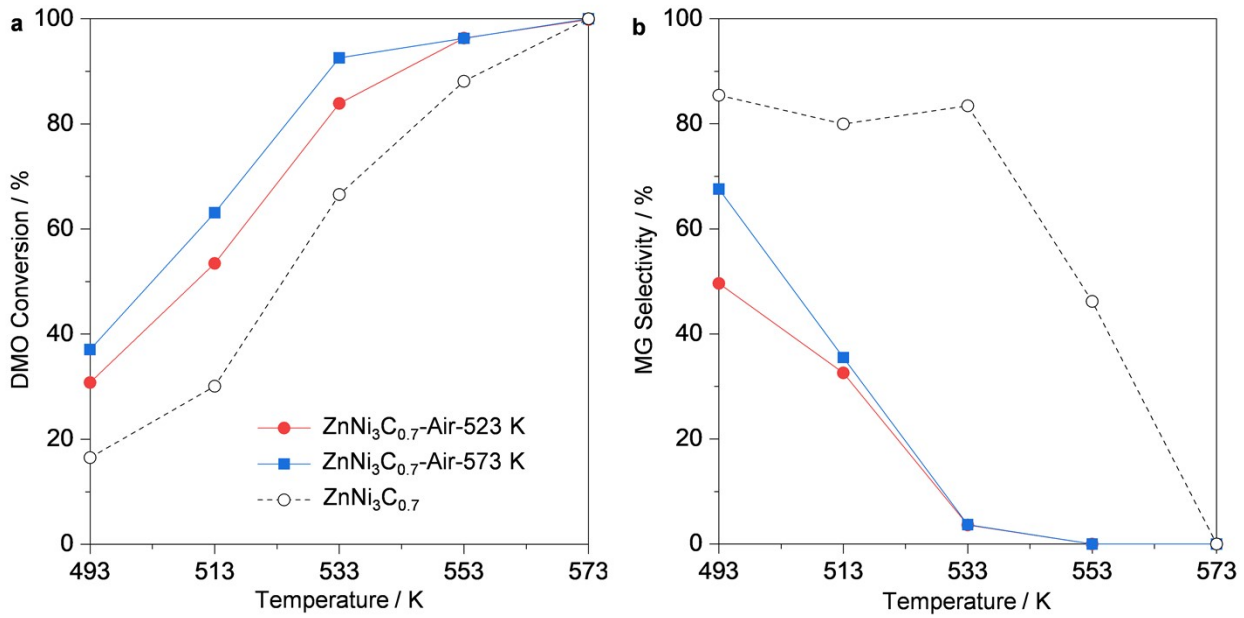


Fig. S8. Catalytic performance of the as-prepared and oxidized $ZnNi_3C_{0.7}$ in the selective hydrogenation of DMO. Conditions: catalyst weight 0.5 g, liquid hourly space velocity based on DMO of 0.55 h^{-1}, molar H_2:DMO of 70, and P = 2.5 MPa. **a**, DMO conversion, **b**. MG selectivity.