Electronic Supplementary Information

$InNi_3C_{0.5}$@C-derived $InNi_3$ alloy as a coke-resistant low-temperature catalyst for selective butadiene hydrogenation

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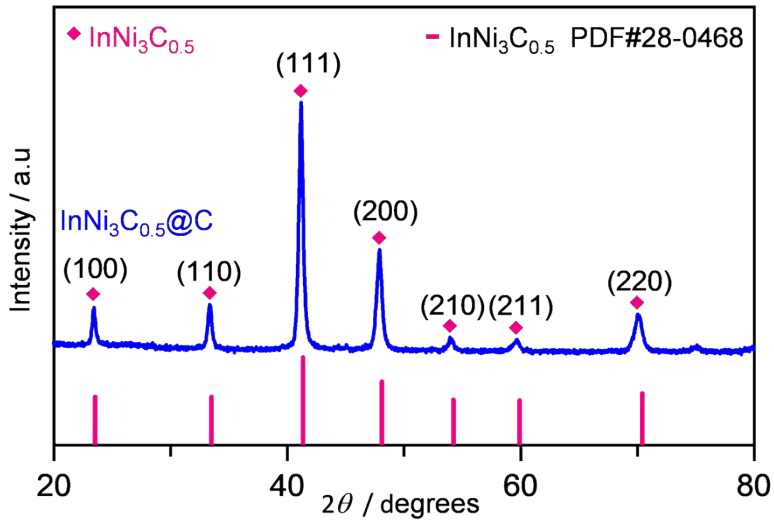


Fig. S1. The PXRD patterns of the as-prepared $InNi_3C_{0.5}$@C.

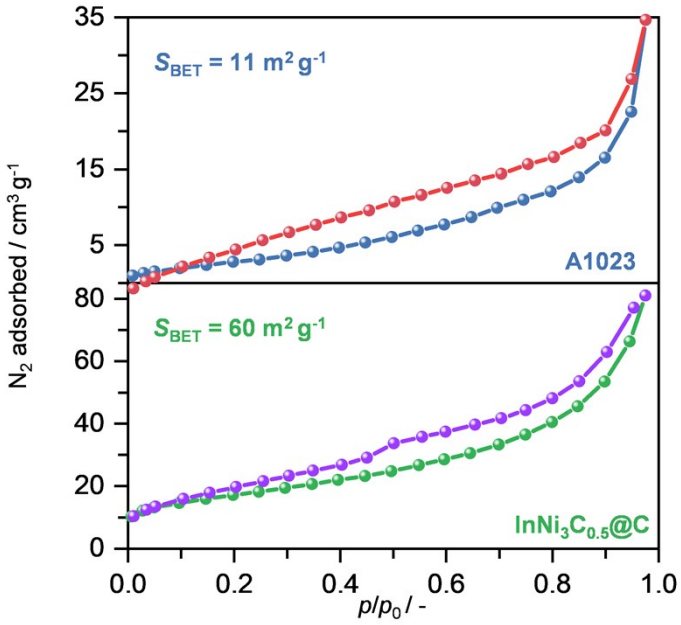


Fig. S2. The N_2 sorption isotherms of pristine $InNi_3C_{0.5}$@C and A1023.

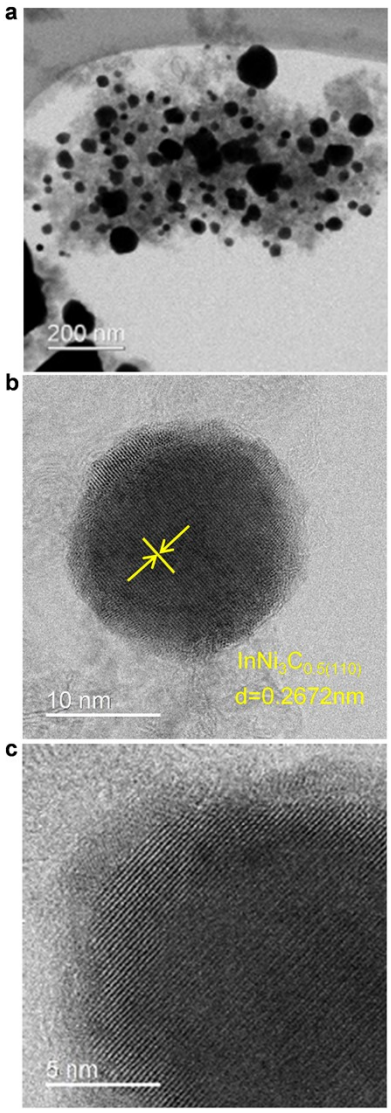
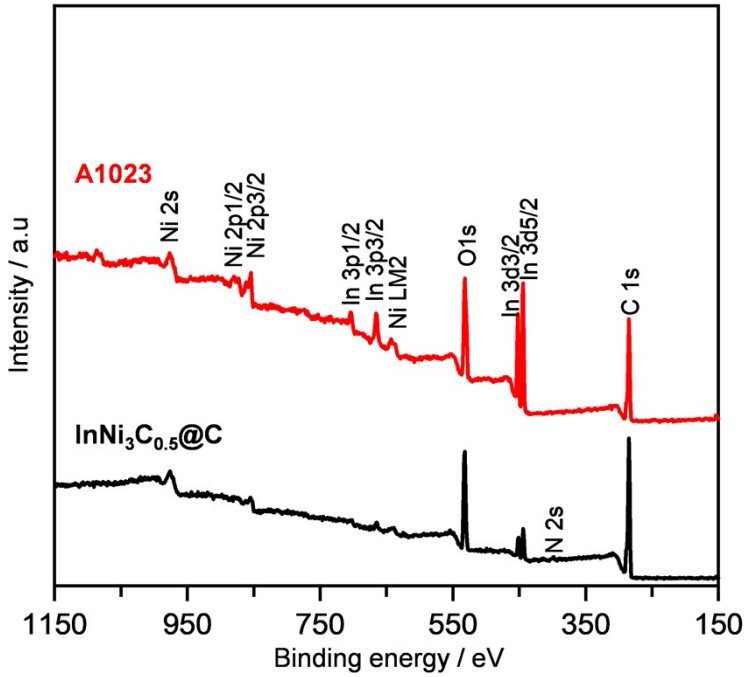


Fig. S3. The STEM images H1023, showing the reduced carbon shells after hydrogenation treatment at 1023 K.



Sample	Ni / at%	In / at%	O / at%	C / at%	N / at%
$InNi_3C_{0.5}C$	1.21	1.08	21.53	74.86	1.31
A1023	4.44	5.53	29.52	60.51	0

Fig. S4. The full XPS spectra of $InNi_3C_{0.5}$@C and A1023 (oxidized at 1023 K), accompanied with the elemental distribution.

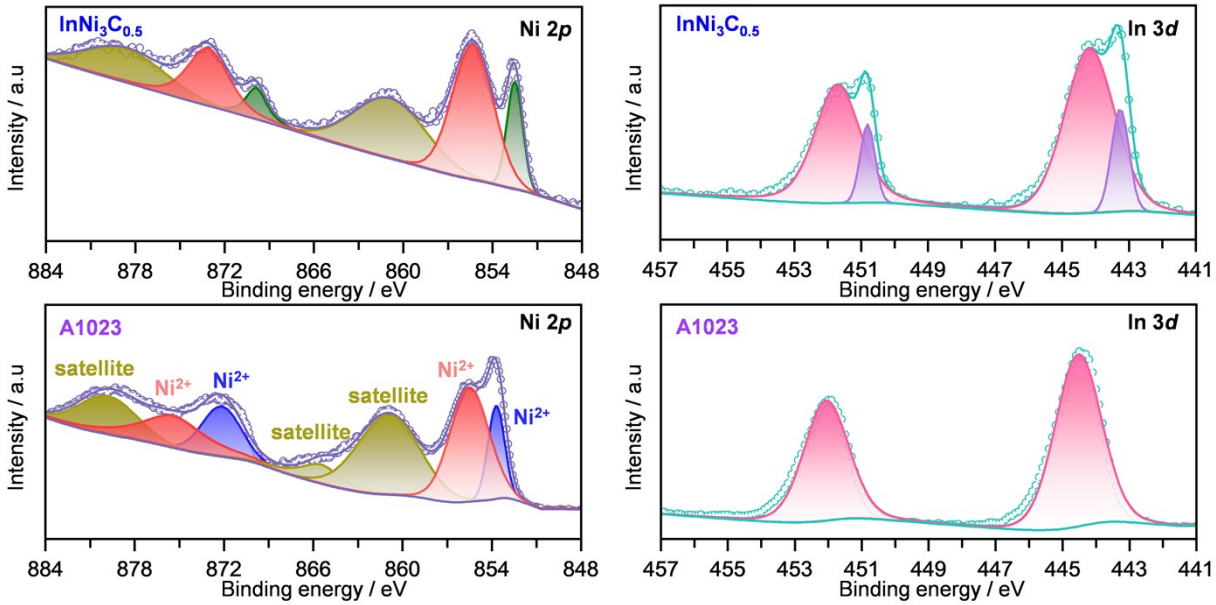


Fig. S5. The Ni 2*p* and In 3*d* XPS spectra of $InNi_3C_{0.5}$@C and A1023 (oxidized at 1023 K).

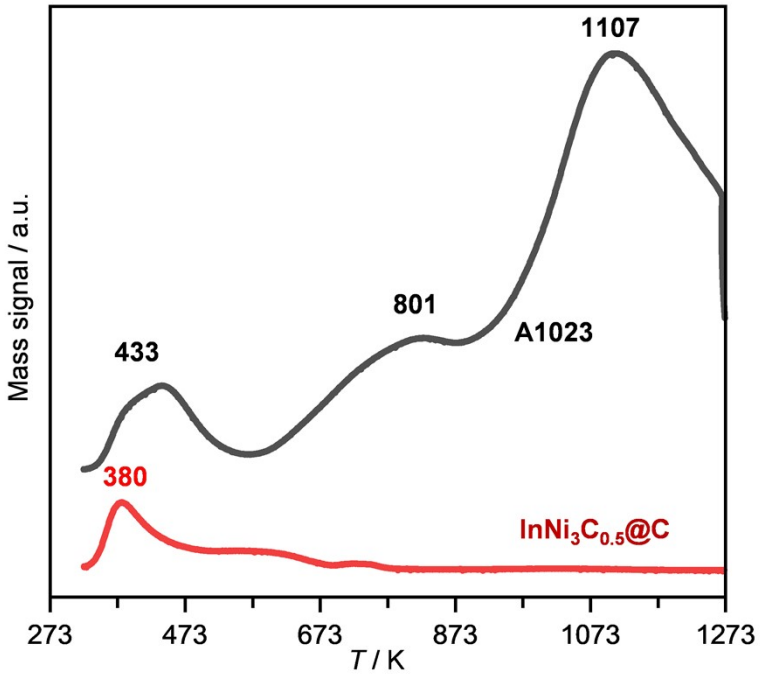


Fig. S6. The mass signals (m/z = 2) during the H_2-TPD experiments on $InNi_3C_{0.5}$@C and A1023.

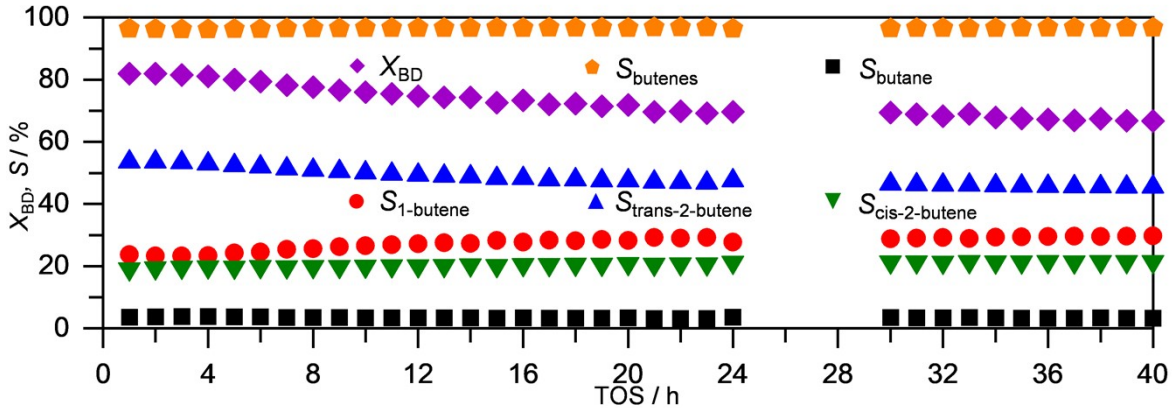


Fig. S7. The stability performance of A1023 in BD hydrogenation. Reaction conditions: 0.69 vol.% BD balanced in N_2, H_2:BD = 50, *GHSV* = 300,000 $cm^3\ g_{cat}^{-1}\ h^{-1}$, *T* = 353 K.

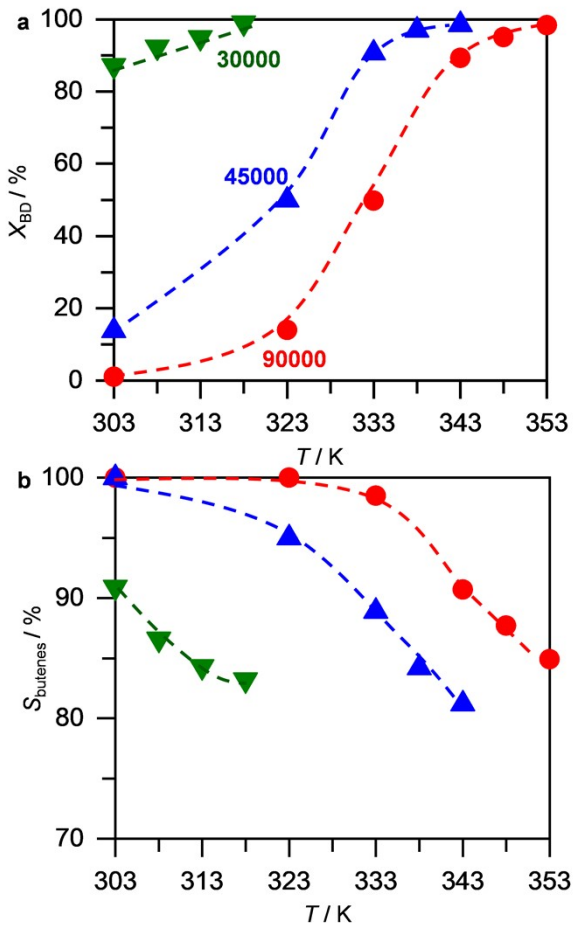


Fig. S8. The **a**, BD conversion and, **b**, product selectivity as a function of temperature in BD hydrogenation on A1023. Reaction conditions: 0.69 vol.% BD balanced in N_2, H_2:BD = 50, *GHSV* = 300,000-900,000 $cm^3\ g_{cat}^{-1}\ h^{-1}$.

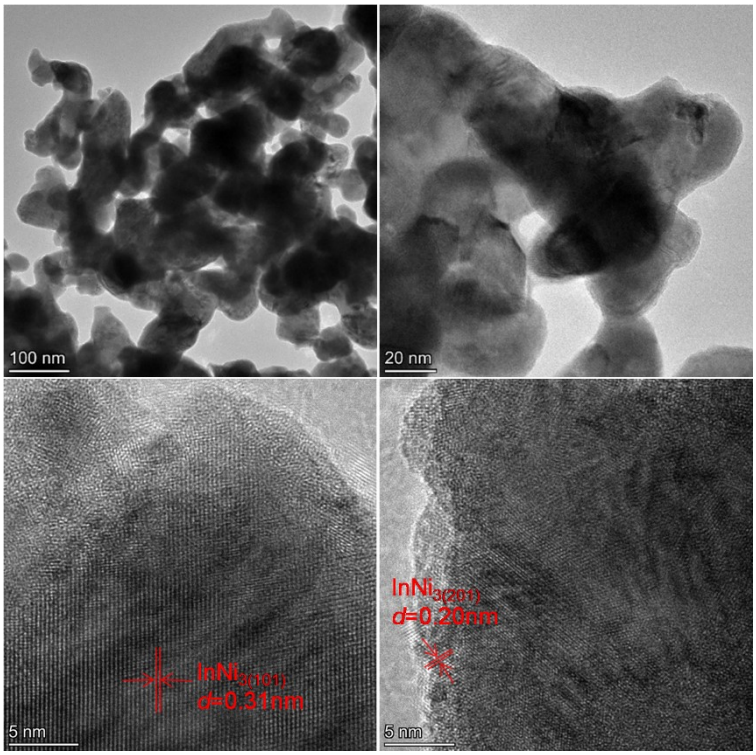


Fig. S9. The TEM images at different magnifications of A1023 after the 24 h evaluation in BD hydrogenation. The distinct (101) and (201) facets of $InNi_3$ alloy were evidenced from the high-resolution TEM images.

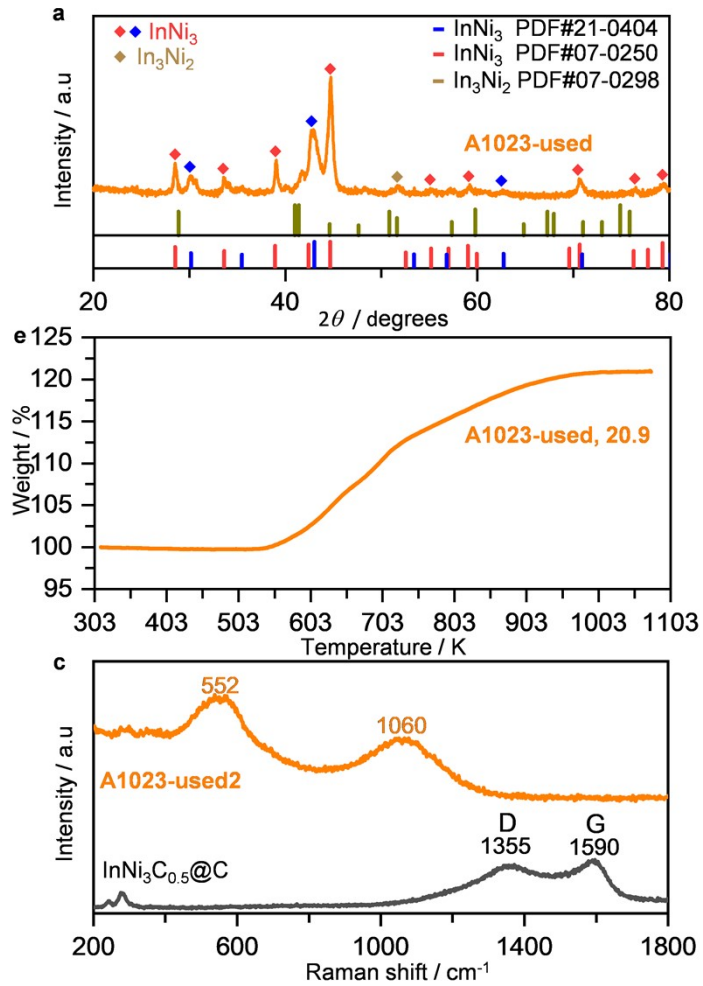


Fig. S10. Characterization of A1023 after the 36 h evaluation in BD hydrogenation at 318 K: **a**, PXRD; **b**, TGA; **c**, Raman spectra.