Supporting information:

Hydrolytic dehydrogenation of ammonia borane over ZIF-67 derived Co nanoparticle catalysts

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Characterization

*Powder X-ray diffraction (XRD)*

XRD of the catalyst precursors was measured in transmission mode using Cu-Kα radiation from a focusing quartz monochromator and a HUBER G670 Guinier camera, recorded from 3-80°, 1h. XRD of the resulting catalysts were measured likewise but with a Stoe STADI P, recorded from 3-80°, 5h. All XRD data are presented as recorded without background correction.

![XRD Analysis](image)

**Figure S1.** XRD analysis of Co/NC-500, Co/NC-300, CoZn/NC-50 and Co/NC-50.

*Nitrogen physisorption*

N₂ physisorption analysis was performed at 77 K on a Micromeritics 3Flex instrument. Prior to the analysis, the samples were outgassed in vacuum for 20 h at 200°C. The total surface area was calculated by the Brunauer-Emmett-Teller (BET) method, the micro-pore volume and external surface area were calculated by the t-plot method and the total pore volume was determined from the isotherm adsorption branch by a single point read at around p/p₀=0.95.
Figure S2. Pore size distributions of catalysts

Scanning electron microscopy (SEM)

SEM was performed with a FEI Quanta 200 ESEM FEG operated at 10-20 kV. All samples were dispersed on carbon tape and coated with Au prior to analysis.

Figure S3. SEM analysis of Co/NC-50nm
Transmission electron microscopy (TEM)

TEM analysis was performed with a FEI Tecnai microscope operated at 200kV. All samples were directly dispersed on holey or lacey carbon grids. Particle size distributions were estimated from measurements of >100 nanoparticles by TEM.

Figure S4. TEM image of ZIF-67-500

Figure S5. TEM image of ZIF-67-300
Figure S6. TEM image of ZIF-67/8-50

Figure S7. a) TEM images of reference materials ZIF-67-300 (900°C) and b) ZIF-67-500 (900°C) carbonized for 2h in Ar at 900°C.
Figure S8. Volume of released H₂ from the catalytic dehydrogenation of ammonia borane using 20 mg catalyst at 25°C with reference catalysts ZIF-67-500 (900°C) and ZIF-67-300 (900°C) carbonized for 2h in Ar at 900°C.

Figure S9. TEM images of recycled Co/NC-50.
Figure S10. Volume of released H₂ from the catalytic dehydrogenation of ammonia borane using 10 mg of catalyst at 25°C with the addition of 0.1 M NaOH and KOH.