Supplementary Material (ESI) for Chemical Communications

Supporting Information

CoSi particles on silica support as a highly active and selective catalyst for naphthalene hydrogenation

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The precursor was dissolved in the $CDCl_3$ at 25 ^oC for the FT-IR, ^{29}Si and ^{13}C NMR analysis. In FT-IR spectrum (Fig. S1), there are three peaks located 2124, 2072, and 2045 cm^{-1}, and in ^{13}C NMR spectrum (Fig. S2), about four δ values could be observed at about 193.9, 77.58, 77.26, and 76.95. The last three δ could be assigned to the presence of $CDCl_3$. These results are in good agreement with the literature.[1] Novak *et al.* had reported that the values were 2118, 2063, and 2036 cm^{-1} for IR spectrum, and δ 192.5 for 13C NMR spectrum. Both FT-IR and ^{13}C NMR spectra demonstrated the presence of carbonyl in the precursor. In ^{29}Si NMR spectrum (Fig. S2), one can see only one δ at 34.9, and Novak et al. had also reported the silicon appeared at 36.1.[1] All the results showed that the precursor we had prepared is $Co(SiCl_3)(CO)_4$.

Fig. S3 gave the TEM images and EDX spectra of the $CoSi/SiO_2$ samples with 7.0%, 13.5% and 17.1% CoSi loadings. From the TEM, CoSi particles were well dispersed on silica, and the size of CoSi particles on SiO_2 become big with the increase of CoSi loadings. EDX spectra further show that there exist Si and Co elements in the particles supported on SiO_2, which further confirmed the formation of CoSi.

Table S1 showed BET surface area and texture parameters of the support and the products. The results indicated that the BET surface area decreased from 668 to 466 m^2/g and the V_p decreased from 0.23 to 0.16 cm^3/g which may be due to the formation of $CoSi/SiO_2$.

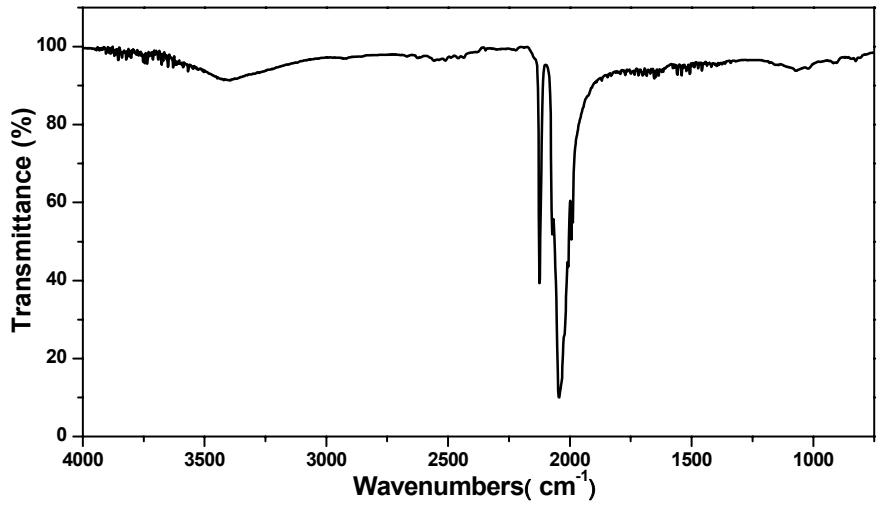

Fig. S1: FT-IR spectrum of organometallic precursor $Co(SiCl_3)(CO)_4$

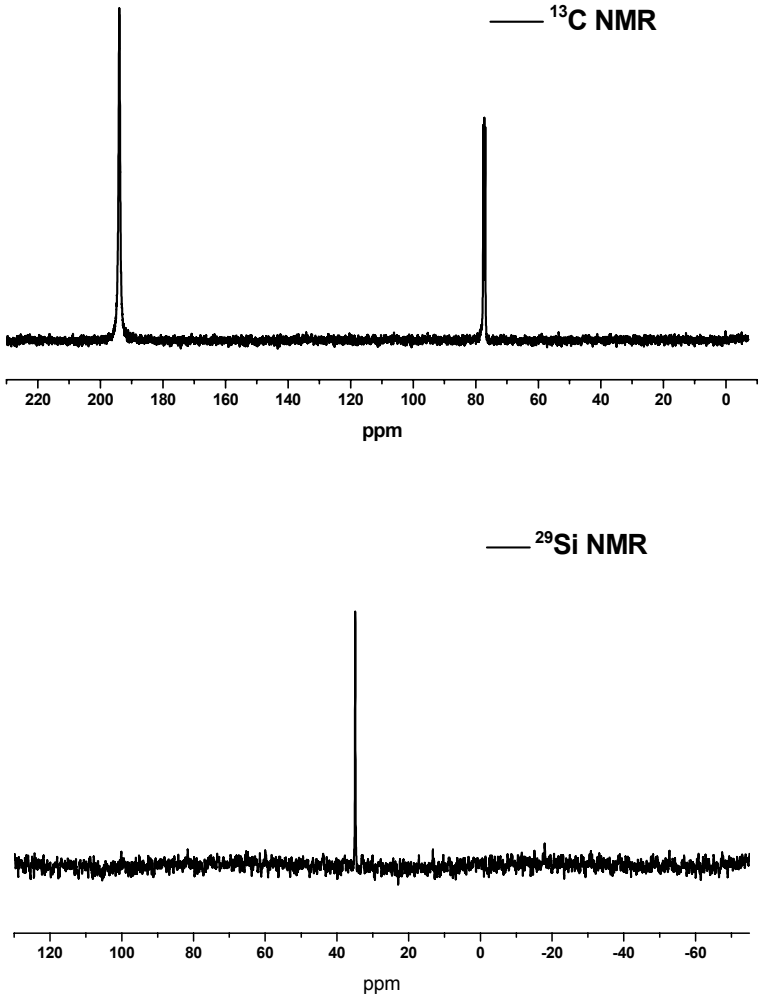

Fig. S2: ^{13}C and ^{29}Si NMR spectra of organometallic precursor $Co(SiCl_3)(CO)_4$

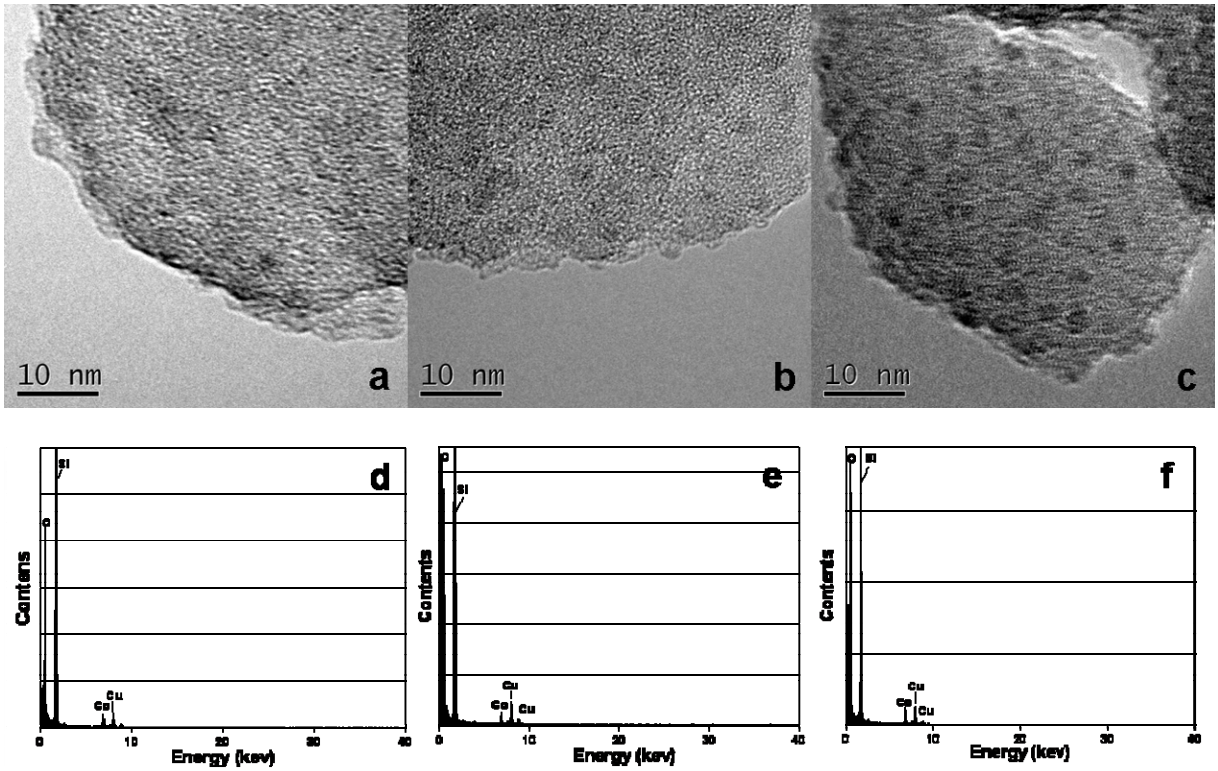

Fig. S3: TEM images and EDX spectra of different loading CoSi/SiO_2. 7.0% CoSi/SiO_2 (a) and (d); 13.5% CoSi/SiO_2 (b) and (e); 17.1% CoSi/SiO_2 (c) and (f)

Table S1: Surface area and texture parameters of SiO_2 and CoSi/ SiO_2

Sample	S_{BET} / m^2/g	Average pore size / nm	Pore volume /cm^3/g
SiO_2	668	2.70	0.23
CoSi/ SiO_2 (7.0%)	506	2.65	0.18
CoSi/ SiO_2 (13.5%)	458	2.63	0.17
CoSi/ SiO_2 (17.1%)	466	2.61	0.16

Reference

1. I. Novak, W. Huang, L. Luo, H. H. Huang, H. G. Ang, C. E. Zybill, *Organometallics*, 1997, **16**, 1567.