Supporting Information

Nitrogen-doped carbon nanotubes encapsulate cobalt nanoparticles as efficient catalyst for aerobic and solvent-free selective oxidation of hydrocarbons

Xiu Lin,[a] Zhenzhen Nie,[a] Liyun Zhang,[b] Shuchuan Mei,[a] Yuan Chen,[a] Bingsen Zhang,*[b] Runliang Zhu[c] and Zhigang Liu*[a]

[a] State Key Laboratory of Chemo/Biosensing and Chemometrics, School of Chemistry and Chemical Engineering, Hunan University, Changsha, 410082, China

[b] Shenyang National Laboratory for Materials Science Institute of Metal Research, Chinese Academy of Sciences, Shenyang, 110016, China

[c] Guangdong Provincial Key Laboratory of Mineral Physics and Material Research & Development, Guangzhou Institute of Geochemistry, Chinese Academy of Sciences, Guangzhou, 510640, China

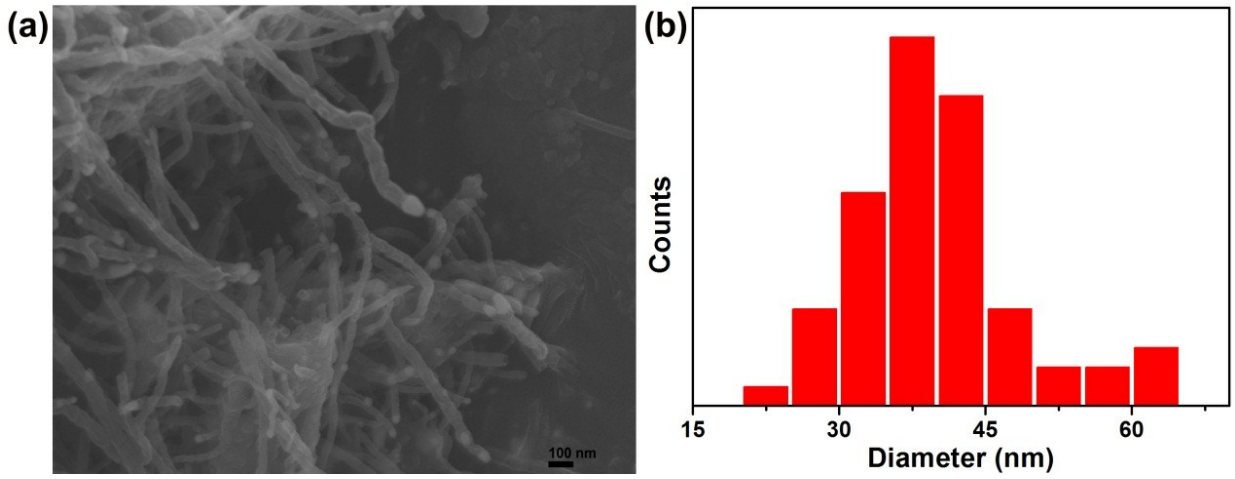

Fig. S1 SEM image and the size distribution of carbon nanotubes for Co@GCNs–900.

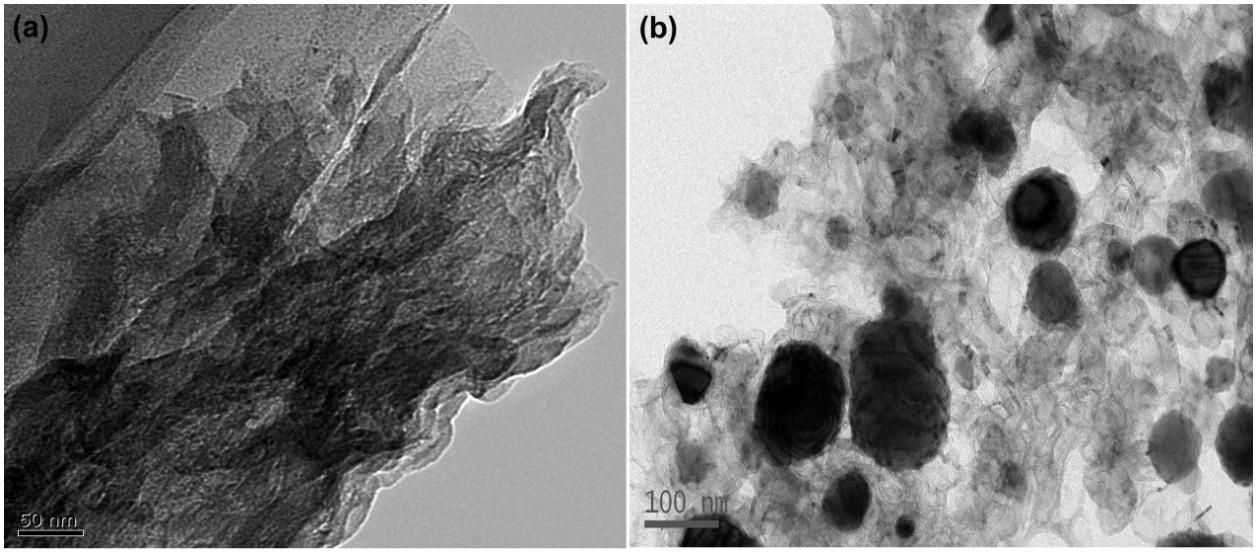

Fig. S2 TEM images of MF−800 and Co/C−800.

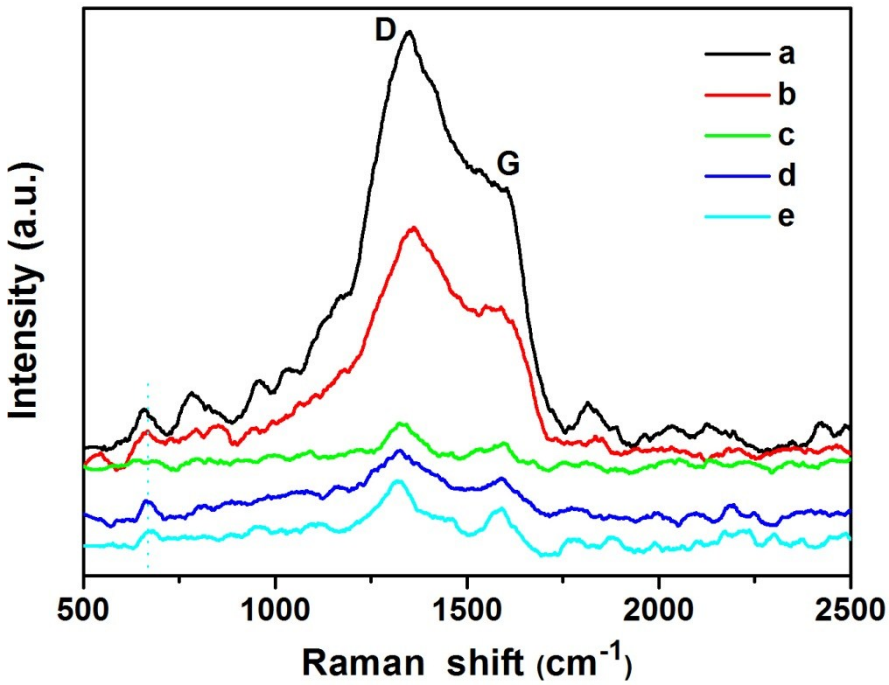

Fig. S3 Raman spectra of (a) Co@GCNs–500, (b) Co@GCNs–600, (c) Co@GCNs–700, (d) Co@GCNs–800, and (e) Co@GCNs–900.

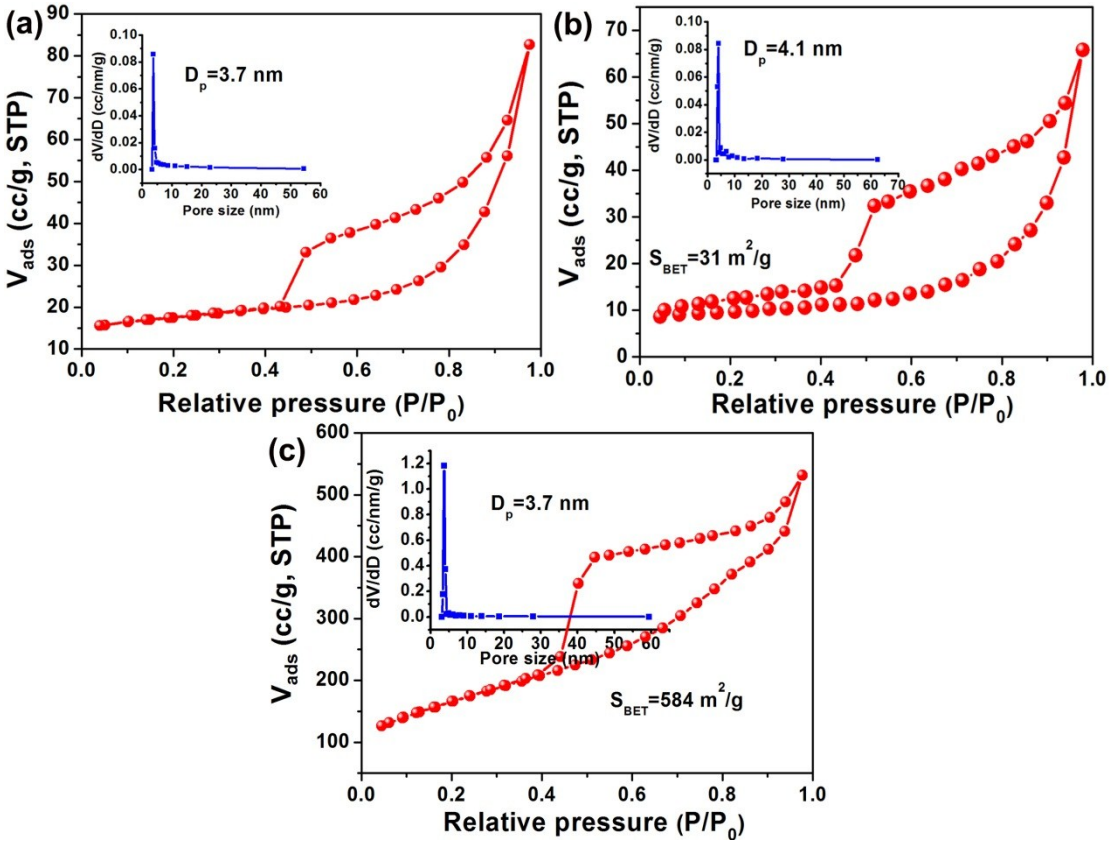

Fig. S4 Nitrogen adsorption–desorption isotherms and pore size distribution of Co/C–800 (a), MF–800 (b), and Co@GCNs–800–AT.

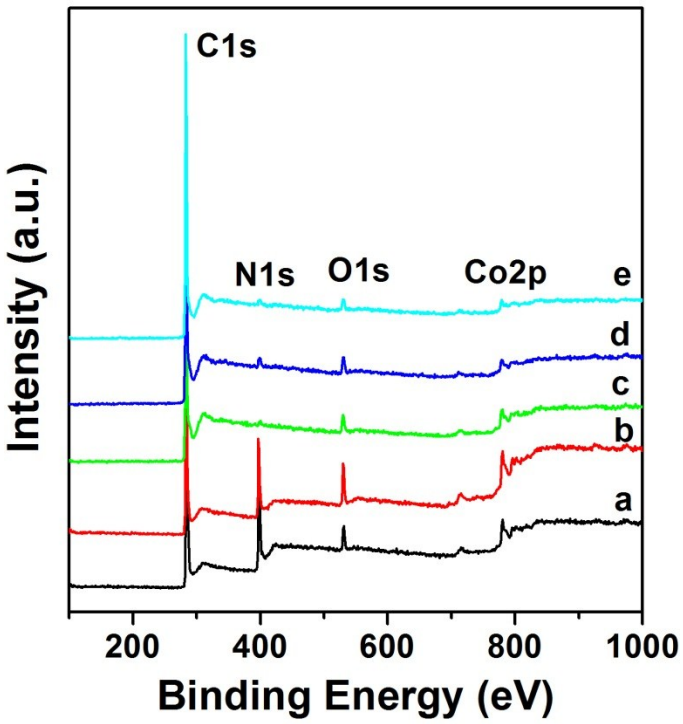

Fig. S5. XPS survey spectra of various Co@GCNs catalysts, a–e represent Co@GCNs–500, Co@GCNs–600, Co@GCNs–700, Co@GCNs–800, and Co@GCNs–900, respectively.

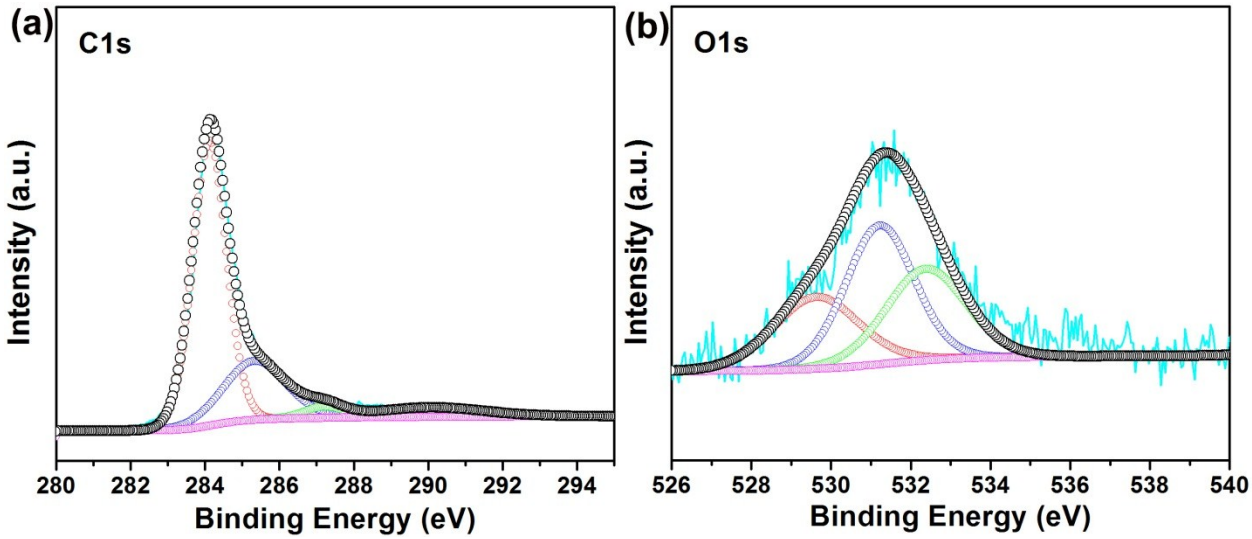

Fig. S6 High-resolution C1s (a) and O1s (b) XPS spectrum of Co@GCNs–800.

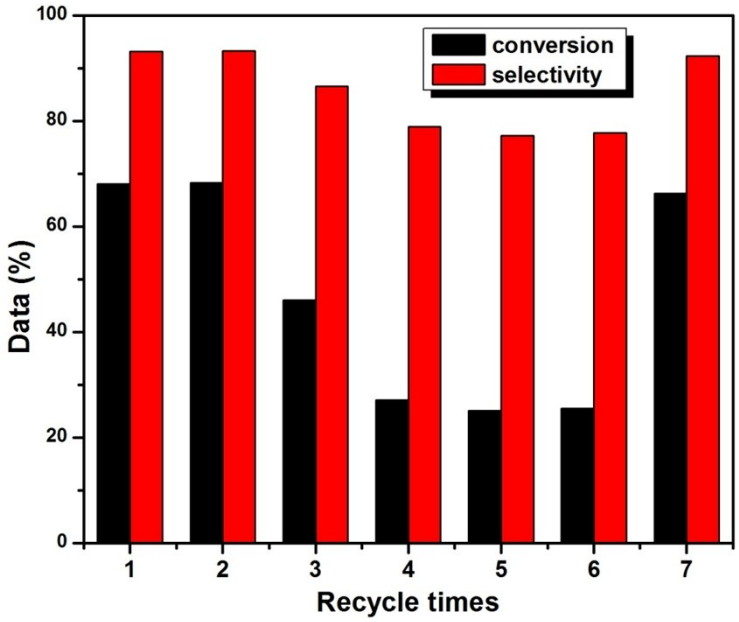

Fig. S7 Reuse of Co@GCNs–800. Note: the catalyst for the seventh reaction comes from the calcination of the catalyst after the first six reactions.

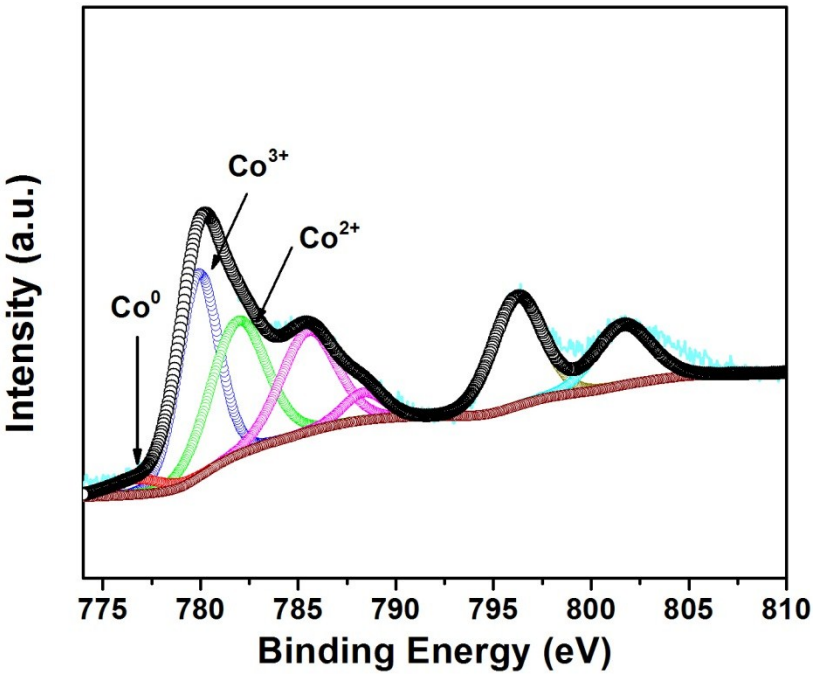

Fig. S8 Co 2p spectrum of recycled Co@GCNs–800 after reaction.

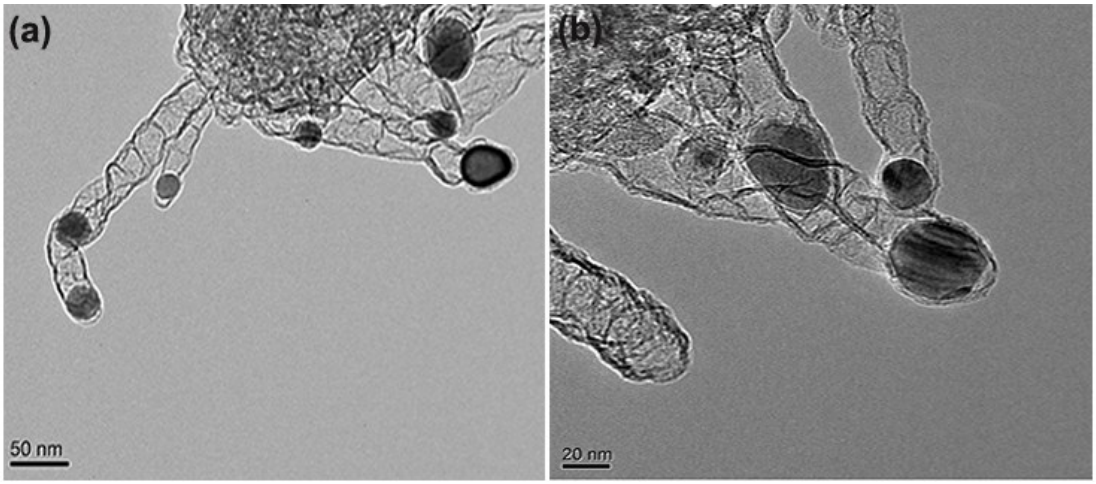

Fig. S9 TEM images of recycled Co@GCNs–800 after reaction.

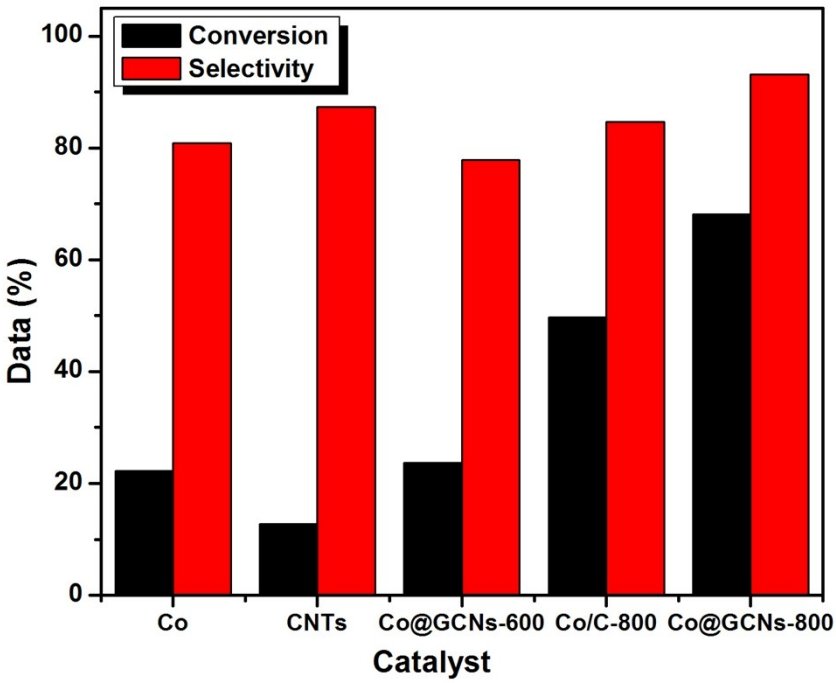

Fig. S10 The comparison for conversion and selectivity of Co, CNTs, Co/CN–800, Co@GCNs–600, and Co@GCNs–800.