The Supporting Information for

A facile low-temperature synthesis of hierarchical porous Co_3O_4 micro/nano structures derived from ZIF-67 assisted by ammonium perchlorate

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Figure S2. (a) SEM and (b) TEM images of ZIF-67.



Figure S3. N₂ adsorption/desorption isotherms and the inset is pore size distribution of ZIF-67.



Figure S4. N_2 adsorption/desorption isotherms of Co_3O_4 particles derived from ZIF-67 at 450

°C.



Figure S5. IR spectra of gaseous products of ZIF-67 decomposition in air.



Figure S6. XRD patterns of the washed ZA heated at 265 °C and 268 °C.

In order to identify the solid product of ZIF-67 decomposition with AP, two samples obtained at 265 °C and 268 °C were washed by distilled water to remove AP and the residual powders were characterized by XRD, and the results were showed in Figure S6. As showed in the black curve, the diffraction peaks at 10.28°, 12.52°, 14.53°, 16.33°, 17.90°, 21.93°, 24.33° and 26.57° were associated to (002), (112), (022), (013), (222), (114), (233) and (134) crystal facets of ZIF-67,^{1,2} respectively. This agreed well with the XRD result of as-prepared ZIF-67 as showed in Figure S1. This indicated that ZIF-67 was not decomposed with AP at 265 °C. As presented in the red curve, the diffraction peaks at 19.09°, 31.42°, 36.94°, 45.02°, 59.59° and 65.42° were ascribed to (111), (220), (311), (400), (511) and (440) crystal facets of Co₃O₄,² respectively, and no more peaks of impurities were found. Therefore, the solid product of ZIF-67 decomposition with AP at 268 °C was Co₃O₄, which was the same as that

of pure ZIF-67 decomposition. The result also indicated that ZIF-67 with AP was decomposed at 268 $^{\circ}$ C rather than at 265 $^{\circ}$ C.



Figure S7. SEM images of the washed ZA samples heated at 265 °C and 268 °C.

As showed in Fig. S7, SEM images of the washed ZA heated at 265 °C and 268 °C revealed their morphologies. The washed ZA samples heated at 265 °C were polyhedral particles with smooth surface and about 200 nm size, which was similar to the morphologies of as-prepared ZIF-67 in Figure S2 and previous works.^{1,2} However, the washed ZA samples heated at 268 °C were polyhedral particles with rough surface and about 200 nm size, similar to the morphologies of pure Co_3O_4 in previous work.²⁻⁴ These SEM results further confirmed that ZIF-67 with AP was decomposed at 268 °C rather than at 265 °C.



Figure S8. XPS spectra of ZA sample with increasing temperature.

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