Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A

Supporting Information for

A sandwich N-doped graphene/Co_3O_4 hybrid: an efficient catalyst for selective oxidation of olefins and alcohols

Renfeng Nie[a], Juanjuan Shi[a], Weichen Du[a], Wensheng Ning[b], Zhaoyin Hou*[,a], Feng-Shou Xiao[a]

a Institute of Catalysis, Department of Chemistry, Zhejiang University, Hangzhou 310028, China

b College of Chemical Engineering and Materials Science, Zhejiang University of Technology, Hangzhou 310014, China

**Address correspondence to zyhou@zju.edu.cn*

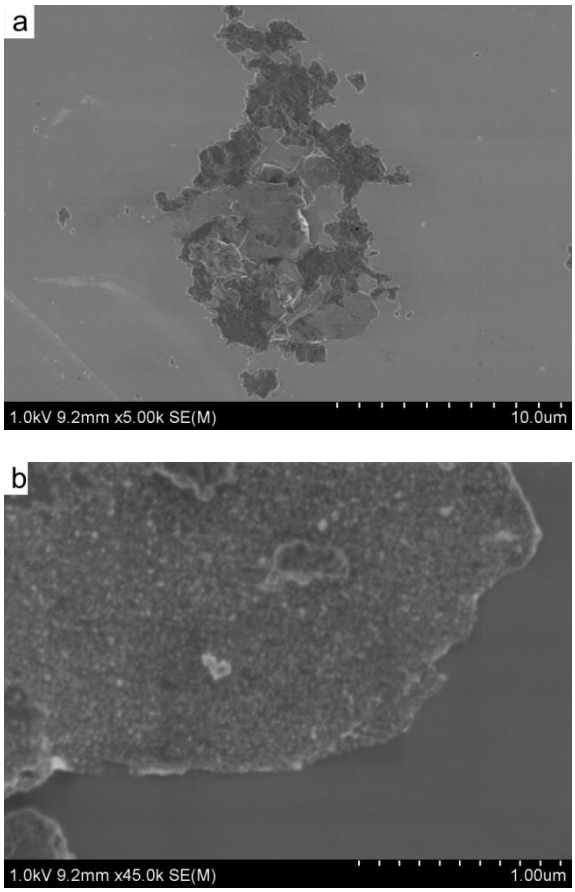

Figure S1. SEM images of Co_3O_4/RGO-$_N$ hybrid

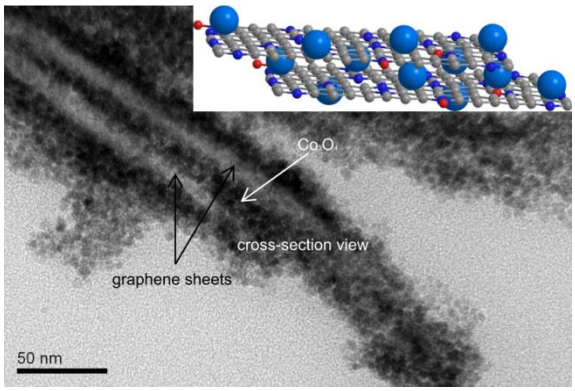

Figure S2. Structural illustration of the N-doped graphene-Co_3O_4 sandwich. TEM image of cross-section view of Co_3O_4/RGO-$_N$ hybrid, the inset is the structural model.

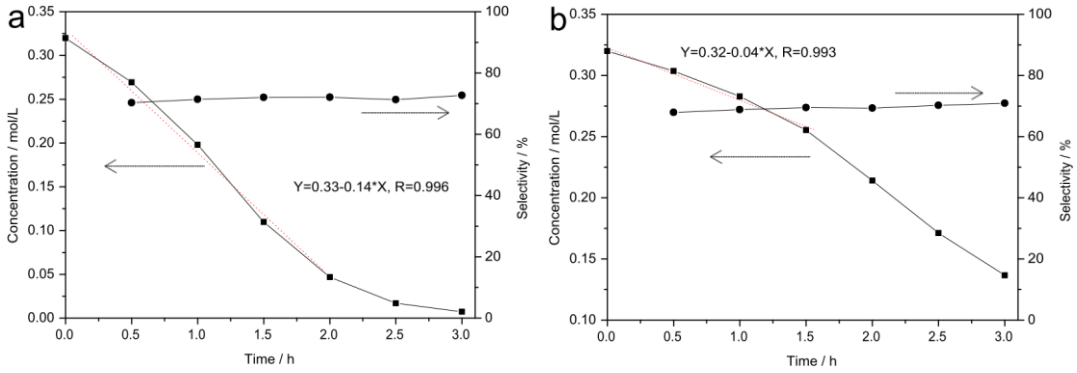

Figure S3. Time-course of epoxidation of styrene with O_2 catalyzed by (a) Co_3O_4/RGO-$_N$ and (b) Co_3O_4/RGO. Reaction conditions: temperature (100 °C), the amount of M (0.15 mmol), styrene (8 mmol), DMF (25 mL), flow rate of O_2 (20 mL/min).

The rate constant of epoxidation reaction could be calculated from the time-concentration courses (these data were added as Fig. S3 in the supporting information). It was concluded that the rate constant of oxidation of styrene over Co_3O_4/RGO-$_N$ (0.14 mol/L/h) is higher than that over Co_3O_4/RGO (0.04 mol/L/h). These data indicated that styrene is more likely to be activated (lower activation energy) over Co_3O_4/RGO-$_N$ due to the high dispersion of Co_3O_4 NPs of RGO-$_N$ sheets, high abundance of Co(III) species derived from the strong interaction between Co_3O_4 NPs and RGO-$_N$, well dispersion of Co_3O_4/RGO-$_N$ in solvent.