Supplementary Material for

The effect of different metal oxides on catalytic activity of the Co$_3$O$_4$ catalyst for toluene combustion: Importance of structure-property and surface active species

Xuejun Zhang $^a$, Min Zhao $^a$, Zhongxian Song $^b$,*, Heng Zhao $^a$, Wei Liu $^a$, Jinggang Zhao $^a$, Zi’ang Ma $^a$, Yun Xing $^a$

$^a$ College of Environmental and Safety Engineering, Shenyang University of Chemical Technology, Shenyang 110142, People’s Republic of China

$^b$ Faculty of Environmental and Municipal Engineering, Henan Key Laboratory of Water Pollution Control and Rehabilitation Technology, Henan University of Urban Construction, Pingdingshan, 467036, People’s Republic of China

Corresponding Authors:

*Z. X. Song: email, songzhongxian@126.com, Tel., (+86)-375-2089031
The La3d peak (Fig. S1a) were deconvoluted into two components, the peak of at 834.7 eV was attributable to La3d$_{5/2}$, while the La3d$_{3/2}$ was observed at about 851.5 eV. The binding energies and the multiplet splitting were consistent with the reported values for the La$^{3+}$ emissions\cite{111}.

The Mn 2p$_{3/2}$ XPS spectra of the Co-Mn sample were shown in Fig. S1b. The peak could be decomposed into two components at BE = 641.5 and 643.2 eV, which were attributable to the surface Mn$^{3+}$ and Mn$^{4+}$ species, respectively\cite{222}.

As shown in Fig. S1c, it displayed two peaks centered at the binding energies of 181.9 eV and 184.3 eV for Zr 3d$_{5/2}$ and Zr 3d$_{3/2}$, respectively\cite{333}.

The peaks of Ni2p$_{3/2}$ and Ni2p$_{1/2}$ core levels were centered at 855.2 and 871.3 eV, respectively, as shown in Fig. S1d, coinciding with the reported values of Ni2p$_{3/2}$ binding energy on metallic Ni\cite{444}.

Reference

