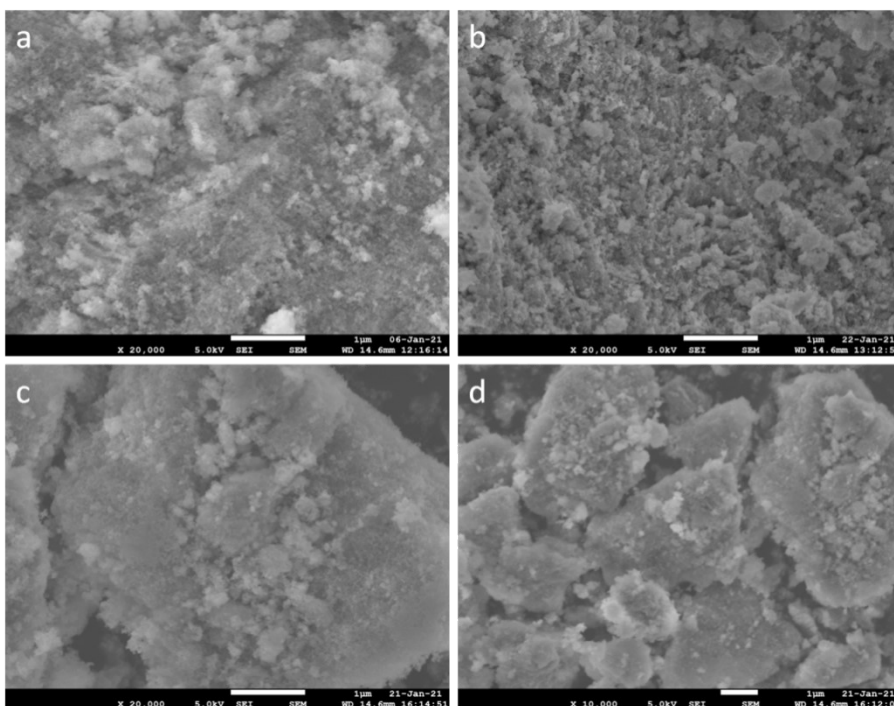
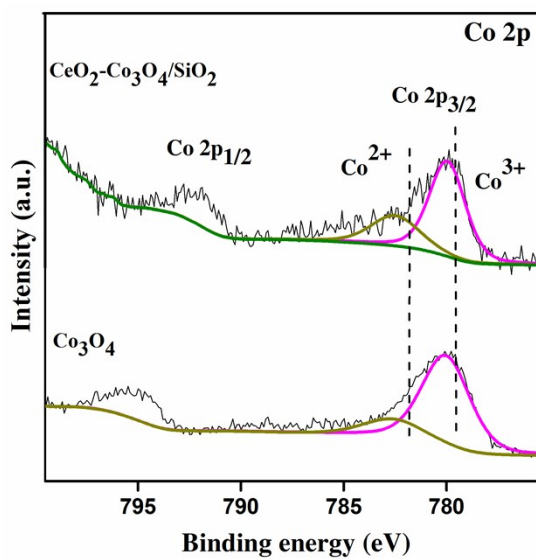


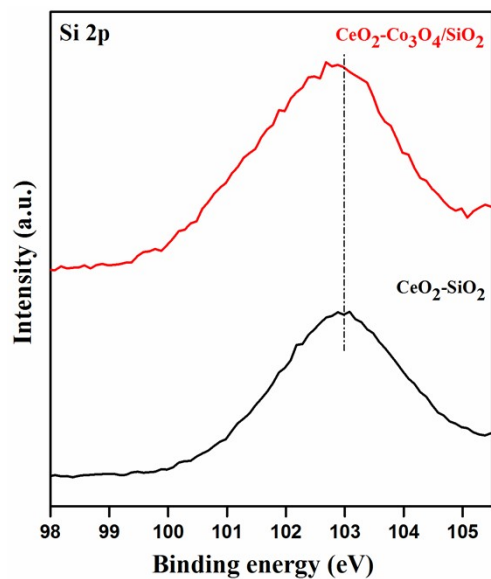
## Supporting information



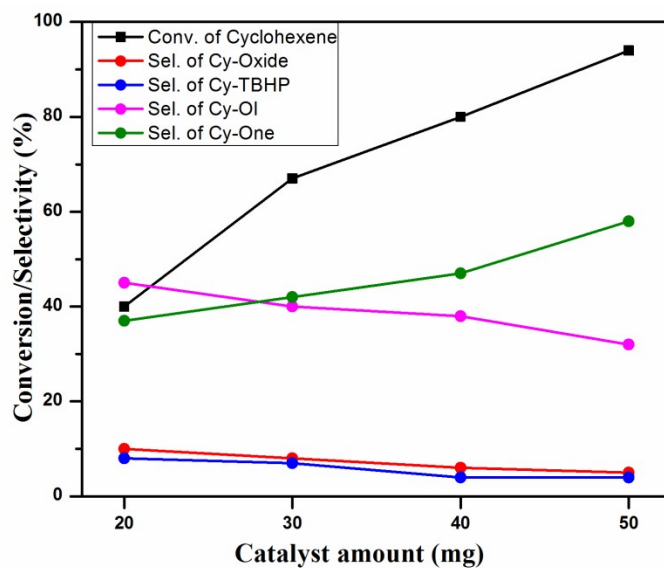
**Fig. S1** FE-SEM images of  $\text{CeO}_2$  (a),  $\text{CeO}_2\text{-Co}_3\text{O}_4$  (b), and  $\text{CeO}_2\text{-Co}_3\text{O}_4/\text{SiO}_2$  (c, d) samples.



**Fig. S2** XPS spectra of Co 2p for pure  $\text{Co}_3\text{O}_4$  and  $\text{CeO}_2\text{-Co}_3\text{O}_4/\text{SiO}_2$  samples.



**Fig. S3** XPS spectra of Si 2p for  $\text{CeO}_2/\text{SiO}_2$  and  $\text{CeO}_2\text{-Co}_3\text{O}_4/\text{SiO}_2$  samples.



**Fig. S4** Effect of catalyst amount on oxidation of cyclohexene over  $\text{CeO}_2\text{-Co}_3\text{O}_4/\text{SiO}_2$  catalyst. Reaction condition: cyclohexene (5 mmol), TBHP (7.5 mmol), time (8 h), temperature (80 °C), and acetonitrile (3 mL).