

## Supplementary Information

### Au/Co promoted CeO<sub>2</sub> catalysts for formaldehyde total oxidation at ambient temperature: role of oxygen vacancies

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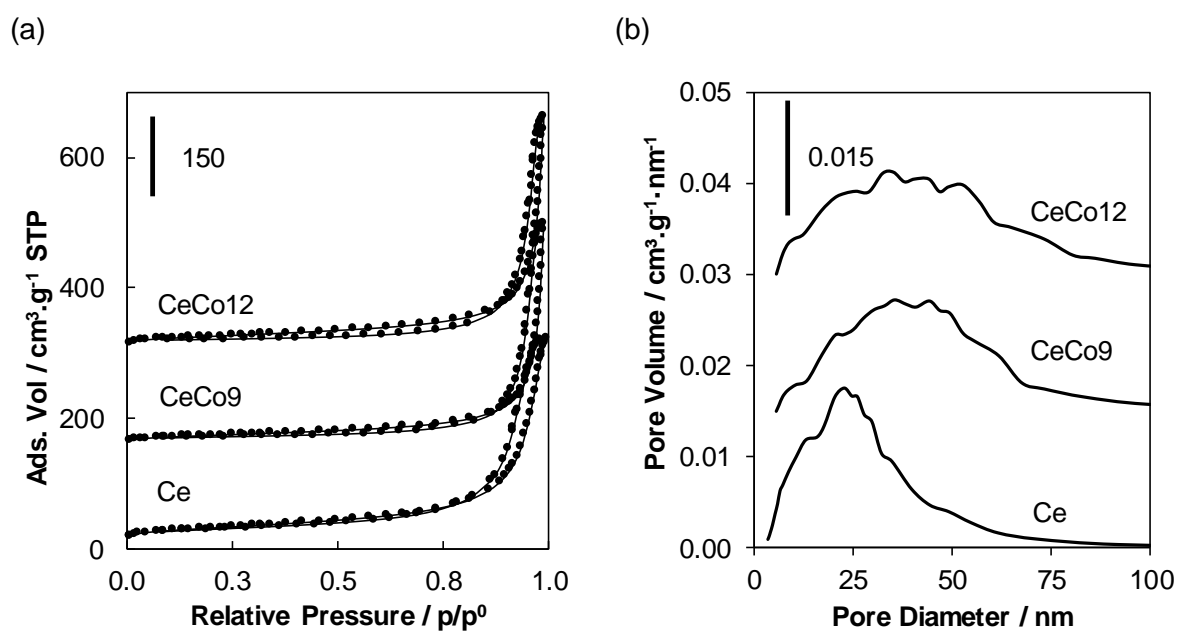
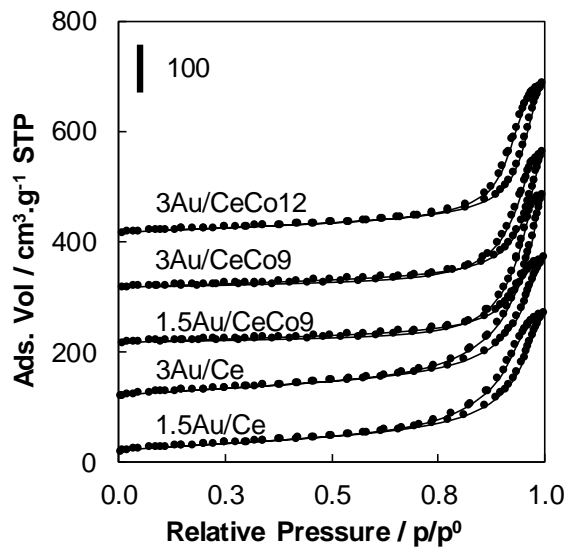


Figure S1 : (a) BET Isotherms and (b) pore size distribution obtained for Ce and CeCO<sub>x</sub> samples

(a)



(b)

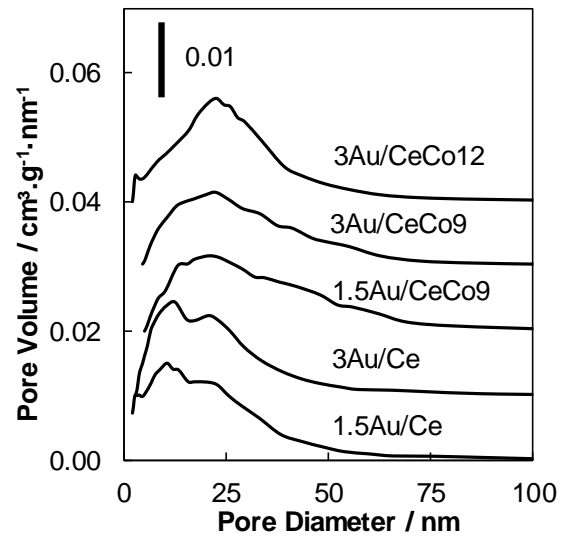


Figure S2 : (a) BET Isotherms and (b) pore size distribution obtained for  $\gamma$ Au/CeCO<sub>x</sub> samples

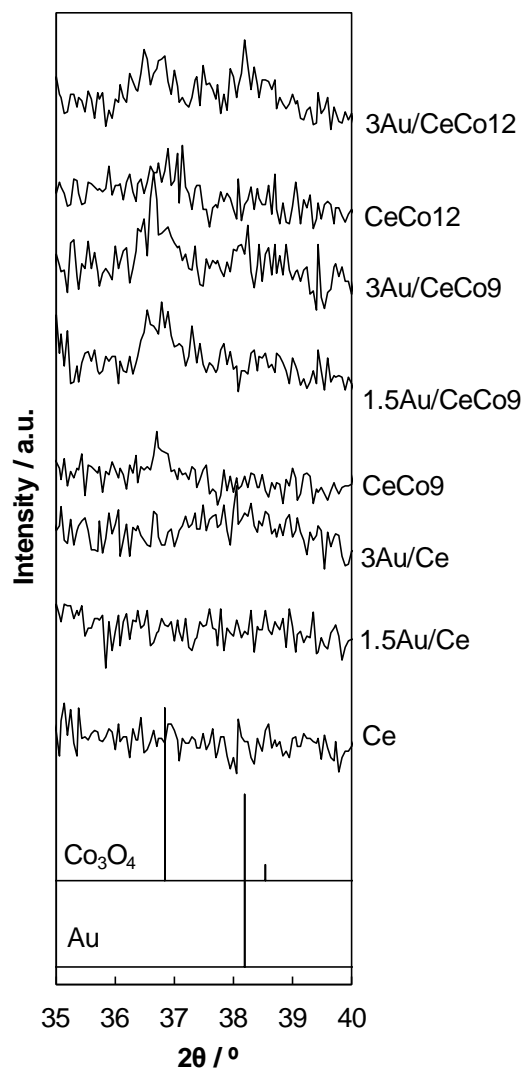


Figure S3 : Zoom of XRD patterns of Ce, CeCox and  $\gamma$ Au/CeCox samples between  $2\theta = 35^\circ$  and  $40^\circ$

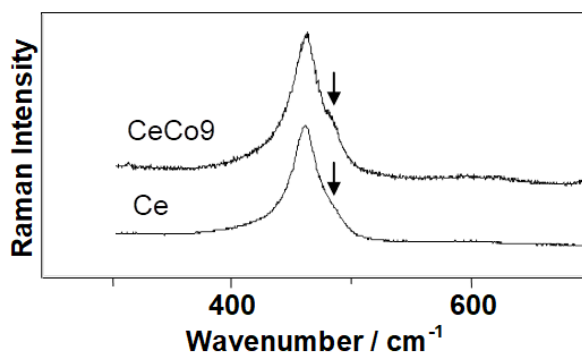


Figure S4 : Micro Raman spectra of Ce and CeCo9 samples

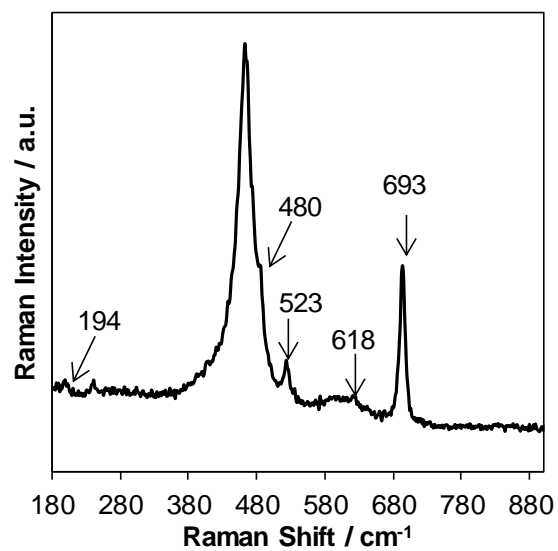


Figure S5 : Micro Raman spectrum of CeCo<sub>9</sub> sample

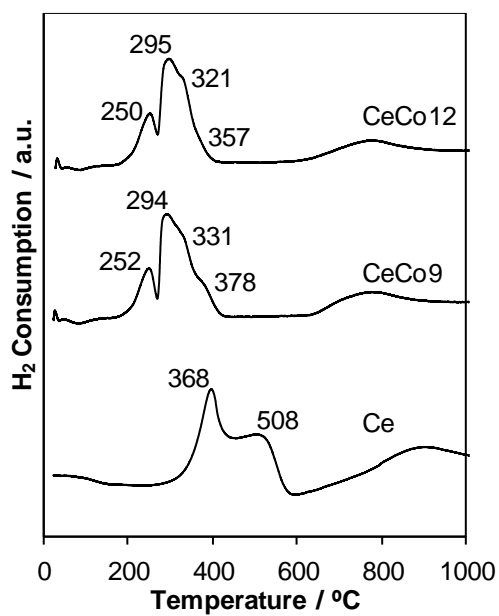


Figure S6 : H<sub>2</sub>-TPR profiles of Ce and CeCo<sub>x</sub> samples

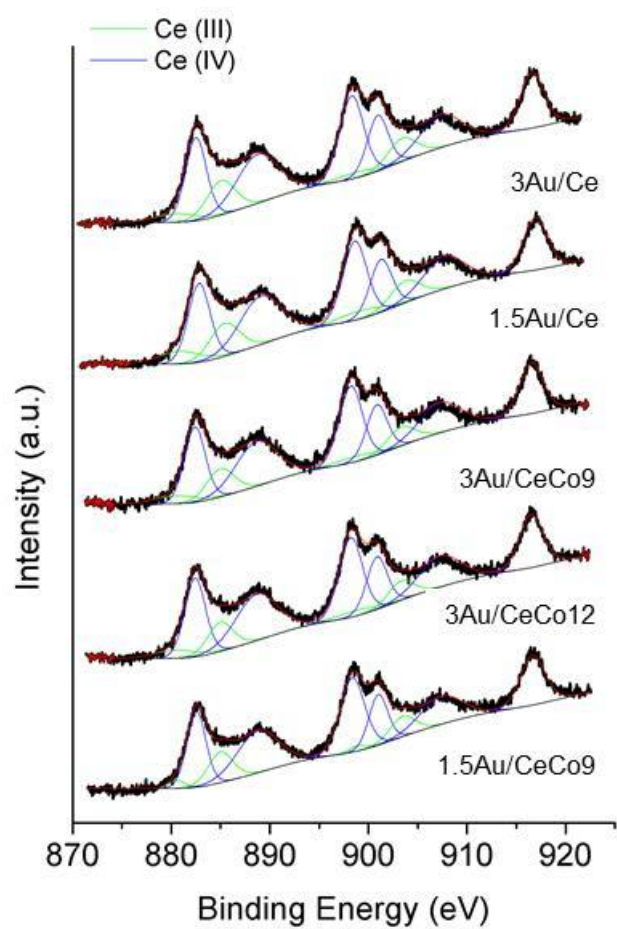


Figure S7 : Ce3d XPS spectra for  $\gamma$ Au/CeCox

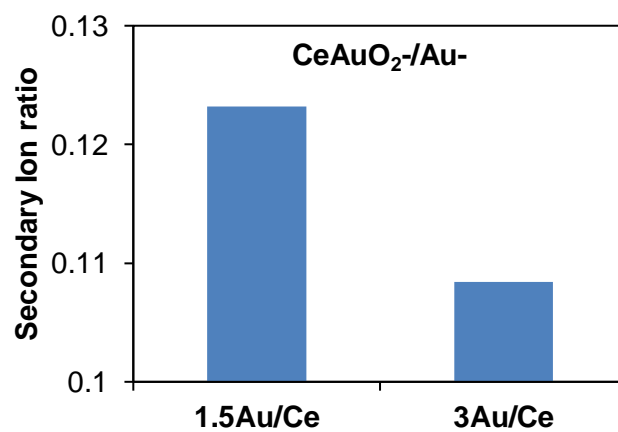


Figure S8 :  $\text{CeAuO}_2^-/\text{Au}^-$  ratio of 1.5Au/Ce and 3Au/Ce

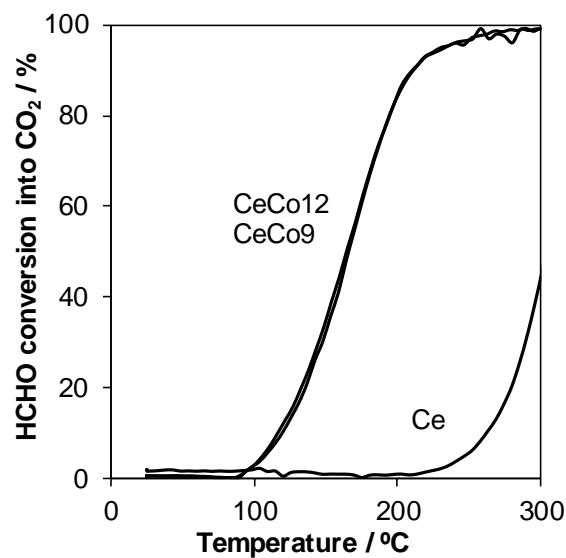
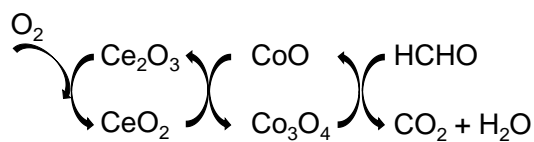


Figure S9 : HCHO light-off curves for the CeCo and Ce supports

Table S1 : Intensity ratio extracted from negative and positive ToF-SIMS spectra

	Ce	CeCo9	CeCo12	1.5Au/Ce	3Au/Ce	1.5Au/CeCo9	3Au/CeCo12
$^{37}\text{Cl}^-/\text{Total}$	0.0002	0.0174	0.0060	0.1054	0.0089	0.1884	0.0462
$\text{AuCl}_2^-/\text{Au}^-$	-	-	-	0.9665	0.0587	1.1876	0.1984
$\text{Au}_4^-/\text{Au}^-$	-	-	-	0.0065	0.0136	0.0090	0.0171
$\text{CoOCl}^-/\text{CoO}^-$	-	1.9035	0.2889	-	-	1.8714	0.7018
$\text{CeCl}_2^+/\text{Ce}^+$	1.5004	0.0103	0.0130	0.0035	0.0231	0.0056	0.0138
$\text{CeOCl}^+/\text{Ce}^+$	1.3645	0.0370	0.0689	0.0130	0.1100	0.0239	0.0632



Scheme S1 : Illustration of the possible synergistic effect between  $\text{CeO}_2$  and  $\text{Co}_3\text{O}_4$  oxides for HCHO oxidation over  $\text{CeCo}_x$  catalysts