

Table S1. EXAFS fitting parameters at the Co K-edge for various samples ($S_0^2=0.78$).

Sample	Shell	CN^a	$R(\text{\AA})^b$	$\sigma^2(\text{\AA}^2)^c$	$\Delta E_0(\text{eV})^d$	R factor
Co ₂ O ₃	Co-O	6*	1.91±0.09	0.0039	-7.0	0.0031
	Co-Co	8*	2.87±0.08	0.0082		
Co foil	Co-Co	6*	3.37±0.03	0.0046	7.3	0.0177
	Co-Co	12*	2.49±0.01	0.0059		
CoO	Co-O	6*	2.10±0.01	0.0062	1.5	0.0055
	Co-Co	12*	3.01±0.01	0.0084		
Co SACs	Co-O/N	4.0±0.1	1.87±0.01	0.0042	-5.8	0.0011
Co NPs	Co-Co	8.0±0.3	2.49±0.07	0.0065	-4.1	0.0117

^a CN , coordination number; ^b R , distance between absorber and backscatter atoms; ^c σ^2 , Debye-Waller factor to account for both thermal and structural disorders; ^d ΔE_0 , inner potential correction; R factor indicates the goodness of the fit. Fitting range: $3.0 \leq k (\text{\AA}) \leq 12$ and $1.0 \leq R (\text{\AA}) \leq 2.0$ (sample Co SACs); $3.0 \leq k (\text{\AA}) \leq 12$ and $1.0 \leq R (\text{\AA}) \leq 3.0$ (sample Co NPs); $3.0 \leq k (\text{\AA}) \leq 12$ and $1.0 \leq R (\text{\AA}) \leq 3.0$ (Co foil, Co₂O₃, CoO) A reasonable range of EXAFS fitting parameters: $0.700 < S_0^2 < 1.000$; $CN > 0$; $\sigma^2 > 0 \text{\AA}^2$; $|\Delta E_0| < 10 \text{ eV}$; R factor < 0.02 .