Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting information

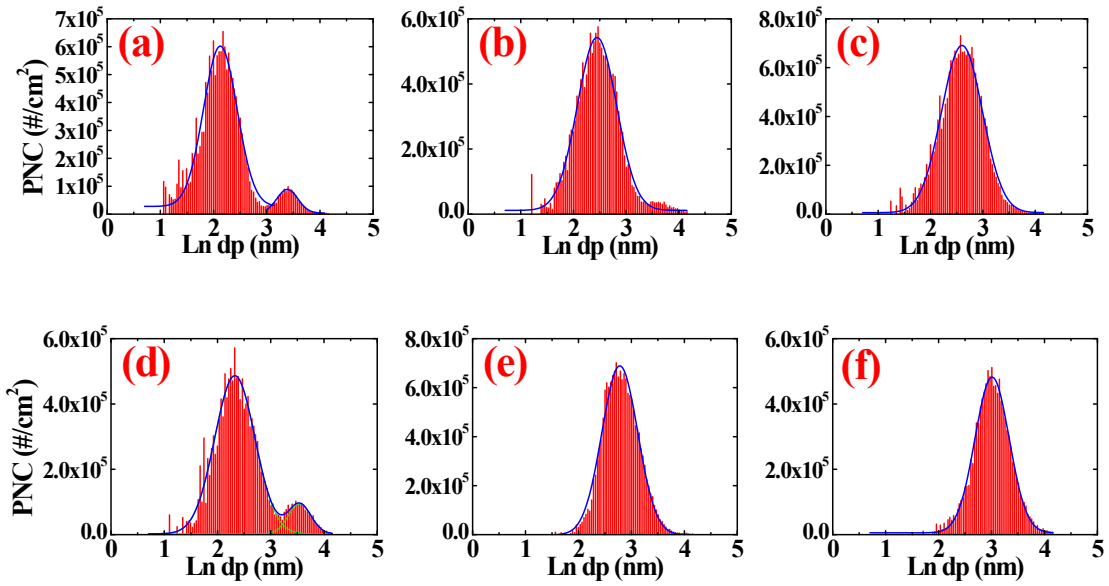


Fig. S1 Fitting of the size distribution for NPs ablated by 1064 nm laser: **(a)** 0.9 J/cm^2, **(b)** 41 J/cm^2, **(c)** 107 J/cm^2; and 532 nm laser: **(d)** 1.0 J/cm^2, **(e)** 43 J/cm^2, **(f)** 114 J/cm^2.

Tab. S1 Comparison of mean sizes and geometric standard deviations (GSD) of synthesized Co_3O_4 NPs under different laser fluence

1064 nm laser			**532 nm laser**		
Fluence (J/cm^2)	Mean size (nm)	GSD	Fluence (J/cm^2)	Mean size (nm)	GSD
0.9	10.2	1.38	1	13.1	1.47
41	12.1	1.45	43	16.5	1.41
107	14.3	1.46	114	21.56	1.4

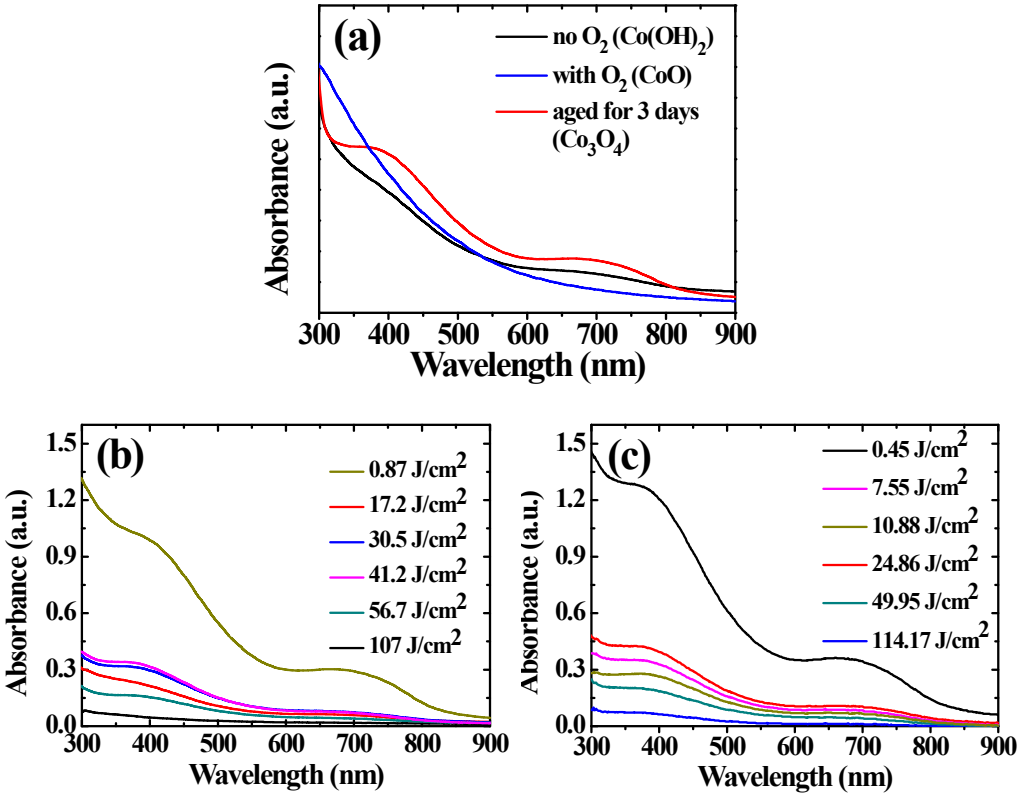


Fig. S2 UV-Vis absorbance of **(a)** intermediate products via LASIS on Co (532 nm laser, 0.45 J/cm^2); **(b) (c)** final products from LASIS on Co at different laser fluences: **(b)** 1064 nm, **(c)** 532 nm.

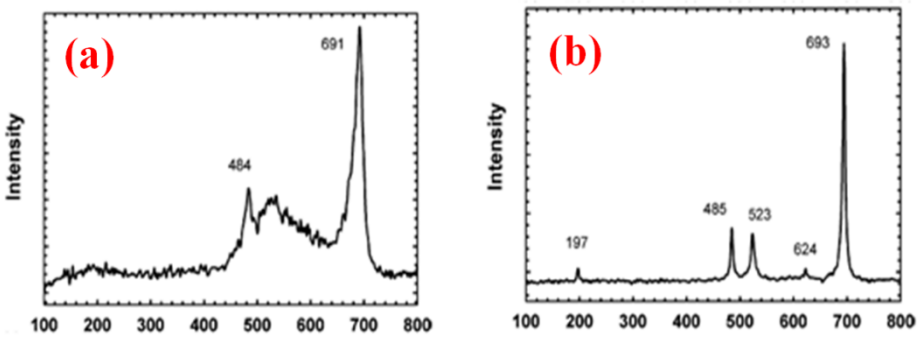


Fig. S3 Standard Raman spectra of **(a)** CoO and **(b)** Co_3O_4 (Gallant, Pézolet, & Simard, 2006)

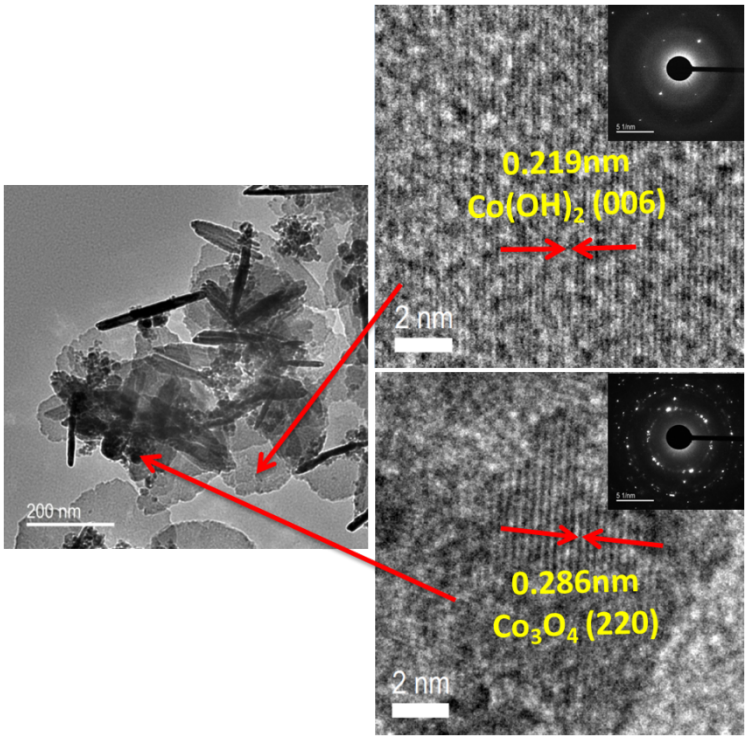
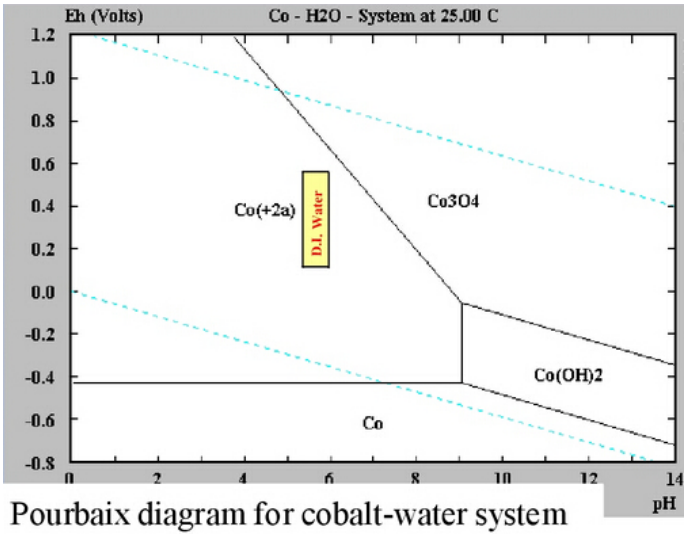


Fig. S4 HRTEM images of the shallow area and spherical area of CoOx NPs through LASIS at pH=14. The inset of the right two images are the corresponding SAED patterns.



Pourbaix diagram for cobalt-water system

Fig. S5 Pourbaix diagram for Cobalt-water system

(http://www.metallographic.com/Data%20Storage/Corrosion.htm)

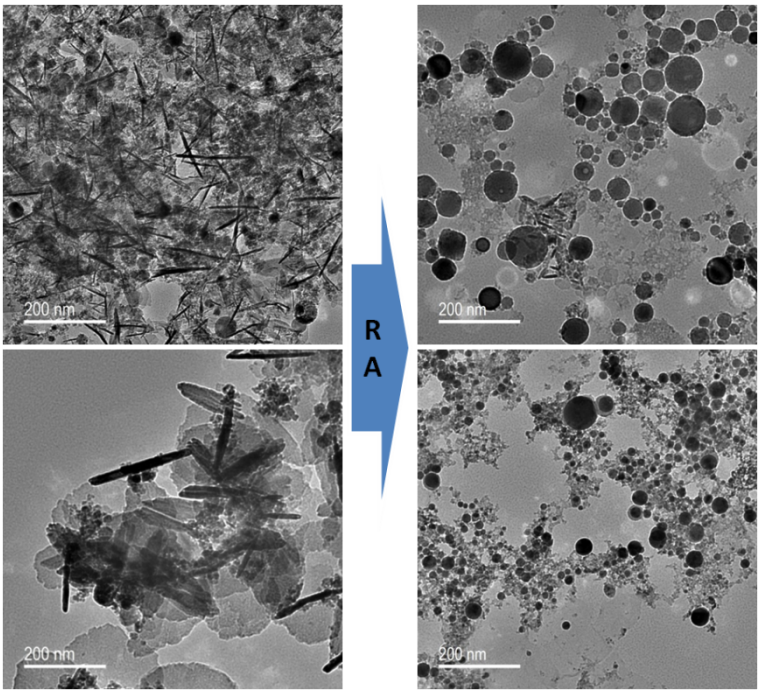


Fig. S6 Re-ablation (RA) by 532 nm laser of Co_3O_4 NRs synthesized through LASIS at pH=13 **(top)** and pH=14 **(down)** for 30 min

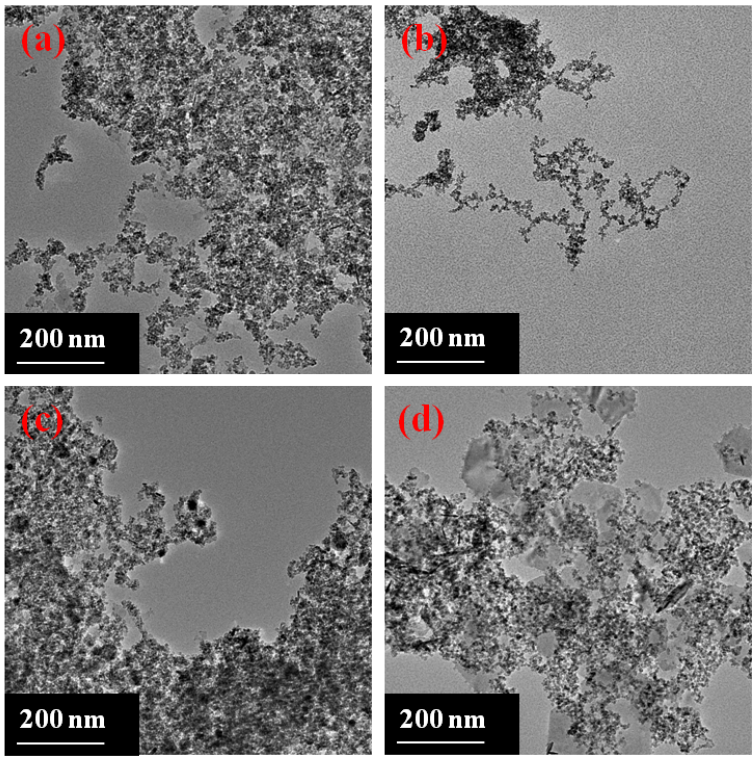


Fig. S7 TEM images of LASIS on Co at pH=2 **(a)**, pH=3 **(b)**, pH=10 **(c)** and pH=12 **(d)**.

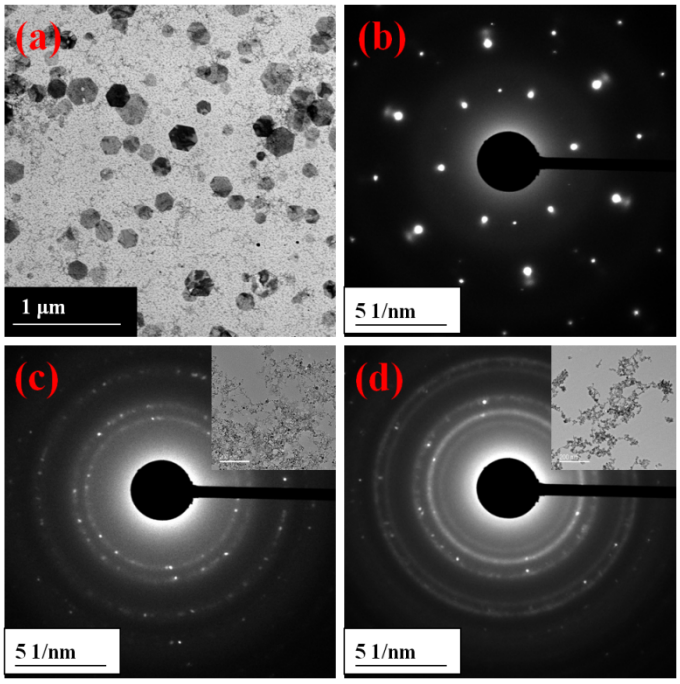


Fig. S8 LASIS of Co using 1064 nm laser at 1 J/cm^2: **(a)** dark field image and **(b)** SAED pattern of β-$Co(OH)_2$ NPs obtained with N_2 purge; **(c), (d)** SAED patterns and the corresponding TEM images (inset, the scale bar is 200 nm) showing evolution of the produced NPs from CoO **(c)** to Co_3O_4 **(d)** after ageing for three days.