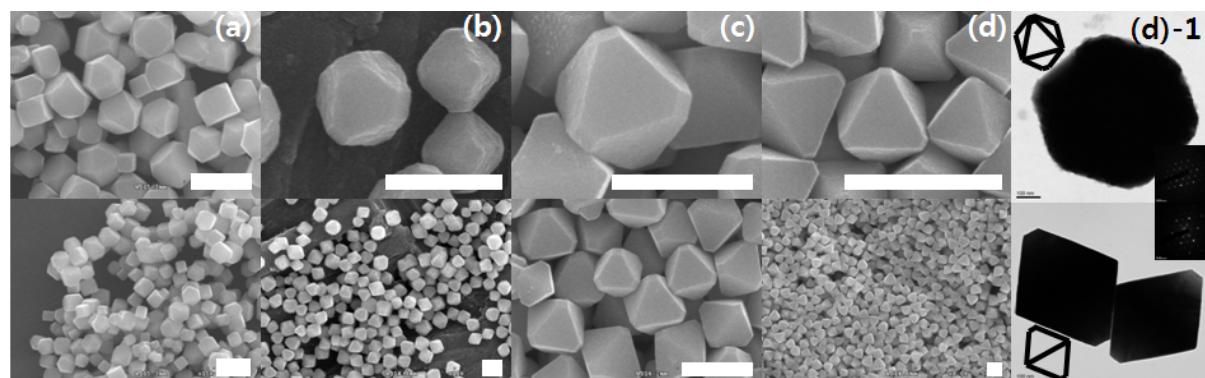


Supporting information

Fabrication of Hollow Metal Oxide Nanocrystals by Etching Cuprous Oxide with Metal (II) Ions : Approach to the Essential Driving Force

Jong Hwa Sohn, Hyun Gil Cha, Chang Woo Kim, Do Kyung Kim and Young Soo Kang*

The specific condition of truncated octahedral Cu₂O are shown in SEM images and table contents. Presence of PVP after washing process was defined by FT-IR. The Nickel ion's etching behaviors with *PVP*-Cu₂O and *nPVP*-Cu₂O are shown in TEM images. And the amounts of remained copper is characterized by EDS.



Sample	Morphology	Size (edge : nm)	Surfactant	Reducing agent	Image	Temp (°C)
C-1	Cubic	480(\pm 30)	None	Ascobic acid	(a)	Room
O-1	Truncated octahedral	450(\pm 160)	PVP (1.9 g)	Ascobic acid	(b)	55
O-2	Truncated octahedral	450(\pm 30)	PVP (2.5 g)	Ascobic acid	(c)	55
O-3	Octahedral	550(\pm 30)	PVP (2.7 g)	Ascobic acid	(d)	55

Figure S1. SEM images of octahedral cuprous oxide nanocrystal by increasing amounts of surfactant, PVP. (Scale bar: 1um) and its TEM image and SAED pattern (d)-1. Specific contents of each sample with reaction condition and size (Table).

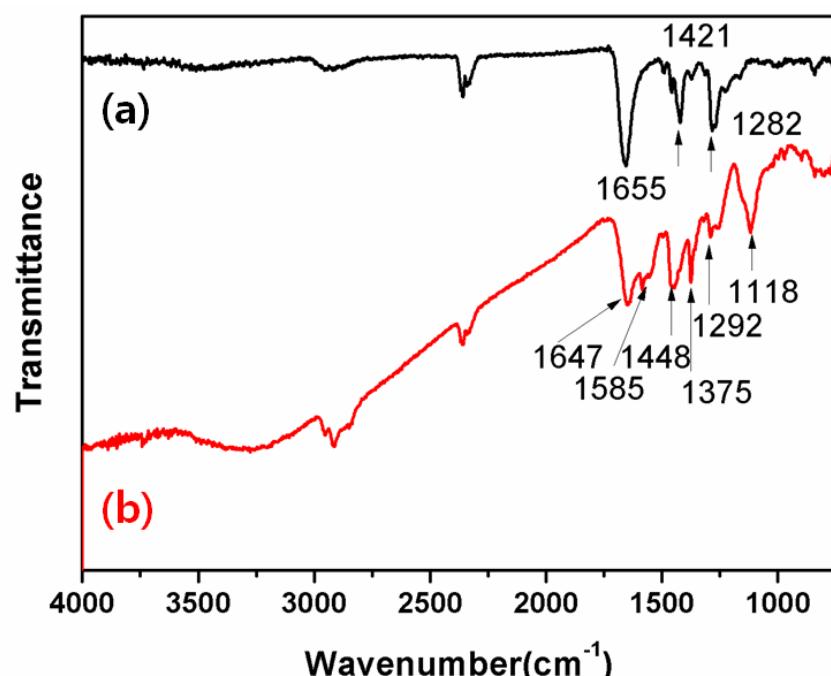
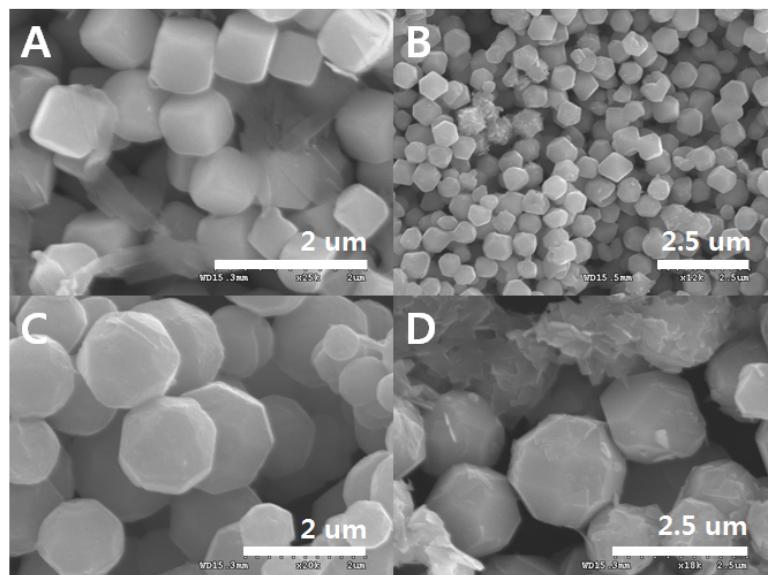


Figure S2. Comparison of FTIR spectrum between PVP (a) and *PVP-Cu₂O* nanocrystal (b).



Sample	Morphology	Size (edge : um)	Cu ²⁺ /OH ⁻ (molar ratio)	Reducing agent	Temp (°C)
A	Cubic	~0.5	1/60	Glucose	70
B	Truncated octahedral	~0.7	1/30	Glucose	70
C	Truncated edge octahedral	~1.5	1/20	Glucose	70
D	Truncated edge octahedral	~2	1/15	Glucose	70

Figure S3. SEM images of octahedral cuprous oxide nanocrystal by increasing amounts of copper acetate as precursor.; Specific contents of each sample with reaction condition and size (Table).

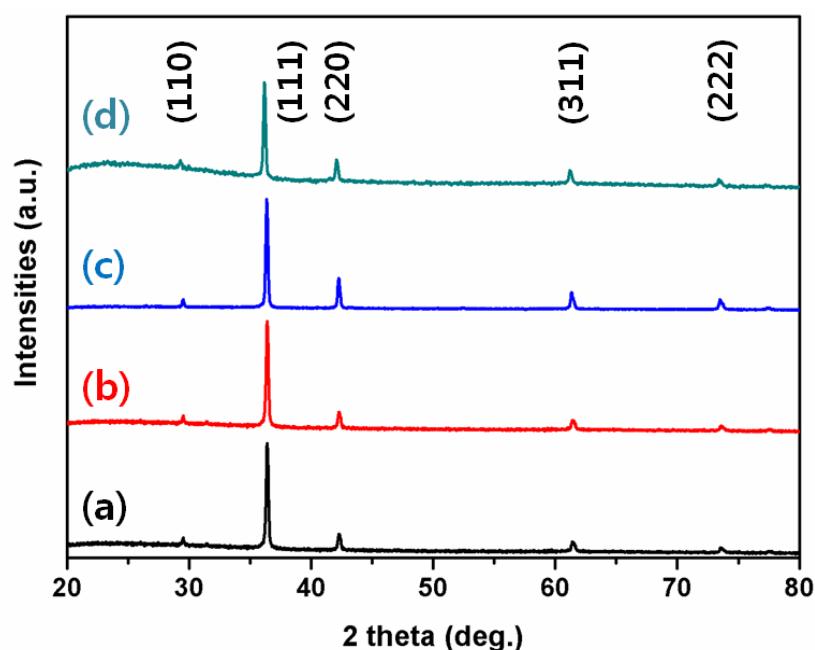


Figure S4. XRD patterns of *PVP*-Cu₂O (a), *nPVP*-Cu₂O (b), Co²⁺ ion etched sample for 1 hr (c) and Fe²⁺ ion etched sample for 1 hr (d).

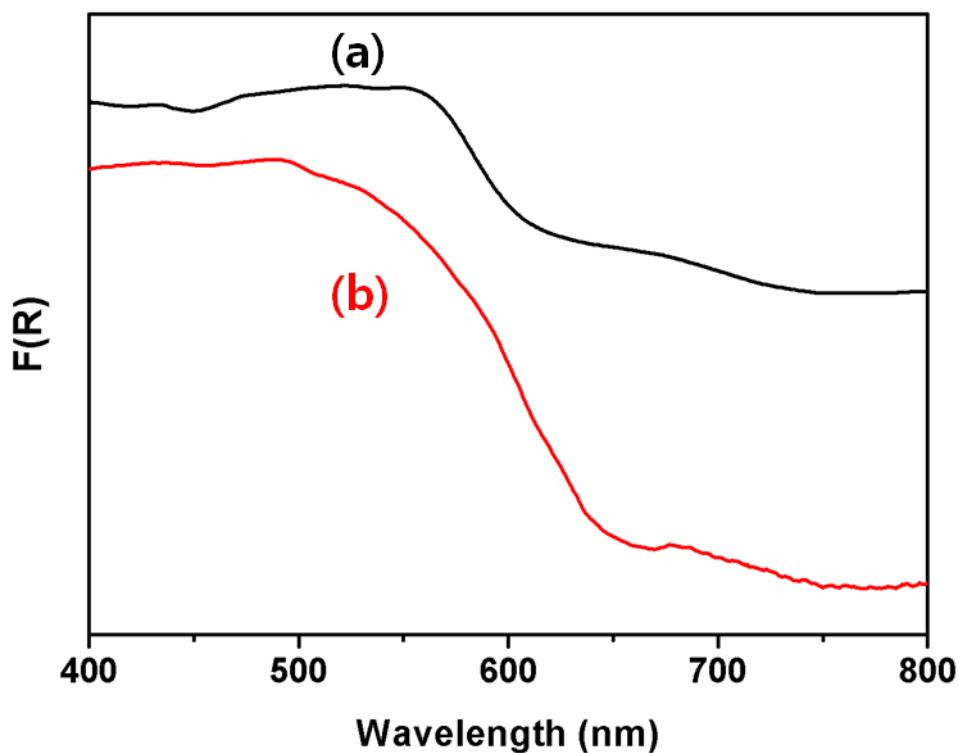


Figure S5. UV-vis measurement of non-hollow strucutre α -Fe₂O₃ (a) and hollow strucutre α -Fe₂O₃ (b) film in reflectance mode.

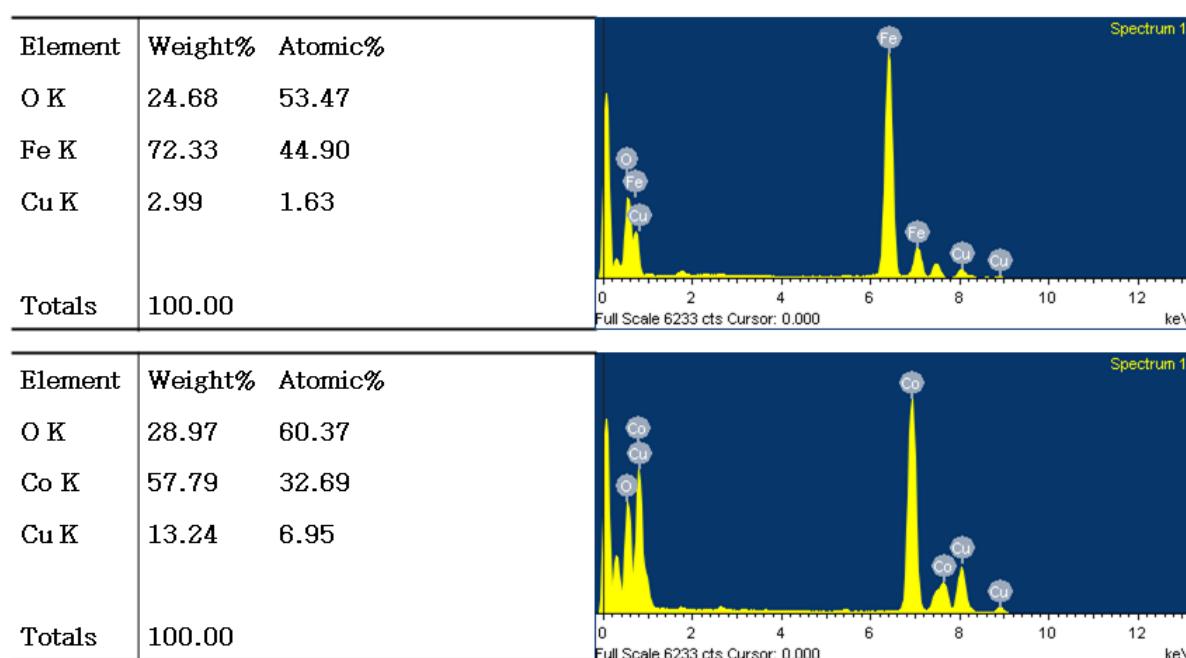


Figure S6. EDX data of $\alpha\text{-Fe}_2\text{O}_3$ and Co_3O_4 hollow crystals which were produced from un-stirring etching condition.