Electronic Supplementary Material (ESI) for CrystEngComm.

Supporting information

Temperature dependent crystallization of Cu_2O rhombic dodecahedra

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Table S1. Chemicals used in this research.

Materials	Purity (w%)	Manufacturer
Anhydrous copper(II) chloride ($CuCl_2$)	98%	Beijing Ouhe
Sodium ascorbate	98%	
Copper(II) sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$)	99%	DAMAO
Hydroxylamine hydrochloride ($NH_2OH \cdot HCl$)	98.5%	
Sodium dodecyl sulfate (SDS)	92.5%	Macklin
Polyvinylpyrrolidone(K30) (PVP)	99.9%	Tianjin Tiantai
Sodium hydroxide	98%	Aladdin
Hydrazine hydrate aqueous solution	50%	Sinopharm
Polyethylene glycols 200 (PEG-200)	99%	Tianjin Kermel

Chemicals: Anhydrous copper(II) chloride ($CuCl_2$; 98%) and Sodium ascorbate were purchased from Beijing Ouhe Technology Co., Ltd. Copper(II) sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$; 99%) and hydroxylamine hydrochloride ($NH_2OH \cdot HCl$) were acquired from DAMAO Chemical Reagent Factory. Sodium dodecyl sulfate (SDS) was purchased from Macklin. Polyvinylpyrrolidone(K30) (PVP) was purchased from Tianjin Tiantai Fine Chemicals Co., Ltd. Sodium hydroxide was acquired from Aladdin. Hydrazine hydrate aqueous solution was acquired from Sinopharm Chemical Reagent Co., Ltd. Polyethylene glycols 200 was purchased from Tianjin Kemiou Chemical Reagent Co., Ltd. All chemicals were used as received without further purification. Ultrapure distilled and deionized water (18.3 MΩ) was used for all solution preparations.

Figure S1. Color of solution evolution with reaction time during the synthesis of d-Cu_2O in the 40 ºC water bath.

Table S2. Size changes of d-Cu_2O with different reaction times at the synthesis temperature of 40 °C

Reaction time	Dimension	Average particle sizes
30 s	76 - 153 nm	110 nm
1 min	15 - 236 nm	167 nm
3 min	170 -345 nm	224 nm
5 min	175 - 305 nm	223 nm
8 min	164 - 274 nm	208 nm
10 min	156 - 242 nm	212 nm
20 min	164 - 266 nm	219 nm
30 min	198 - 268 nm	233 nm
60 min	171 - 306 nm	238 nm

Table S3. Size changes of d-Cu_2O with different temperatures.

Temperature (ºC)	Dimension	Average particle sizes
31	1253 -1468 nm	1351 nm
32	791 - 1364 nm	1197 nm
33	850 -1122 nm	1037 nm
34	780 - 860 nm	820 nm
35	391 - 635 nm	577 nm
36	400 - 496 nm	451 nm
37	353 - 437 nm	400 nm
38	315 - 456 nm	377 nm
39	252 - 335 nm	288 nm
40	217 - 320 nm	254 nm
45	134 - 257 nm	177 nm
50	113 - 243 nm	153 nm
55	66 - 266 nm	150 nm
60	100 - 250 nm	142 nm

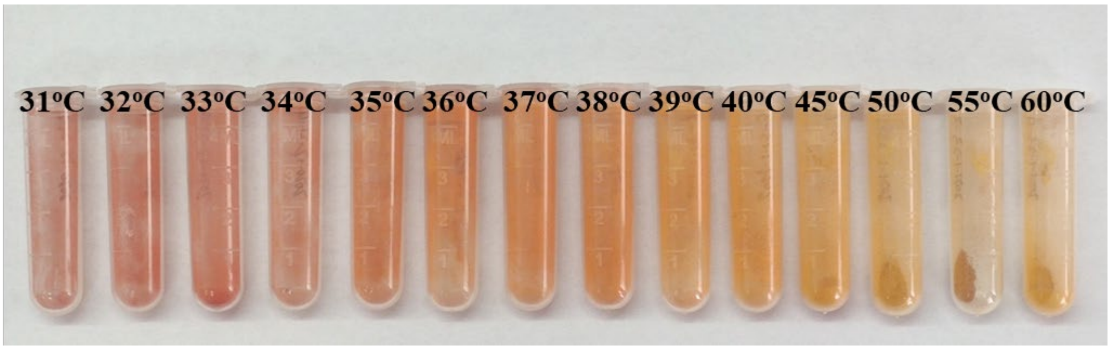

Figure S2. Color changes of d-Cu_2O with the increase of temperature at the temperature range from 31-60 ºC.

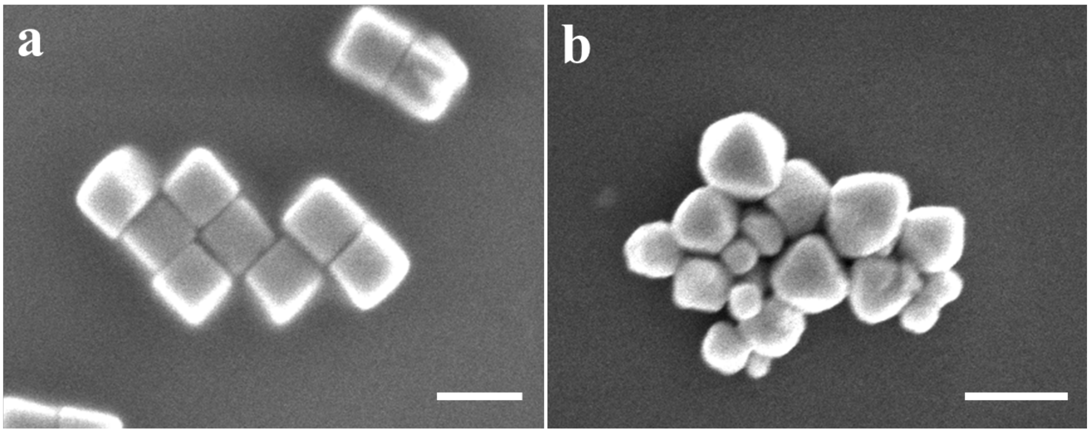

Figure S3. SEM patterns of (a) c-Cu_2O and (b) o-Cu_2O. Scale bars = 200 nm.

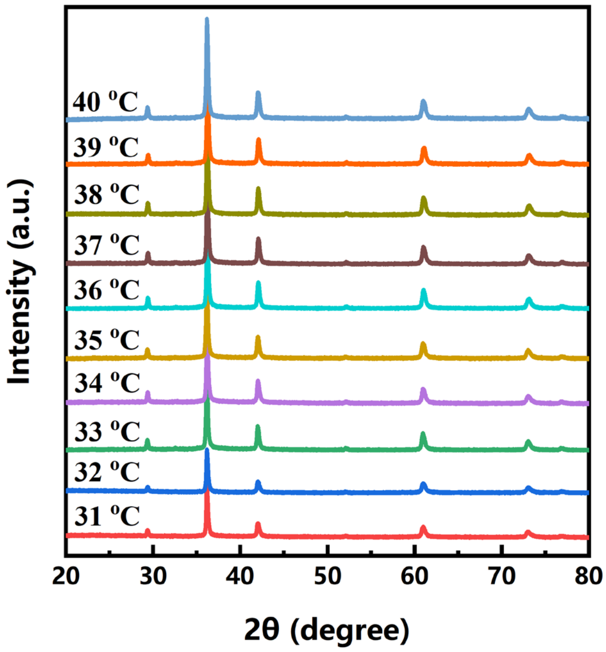

Figure S4. XRD patterns of d-Cu_2O synthesized at different temperature.

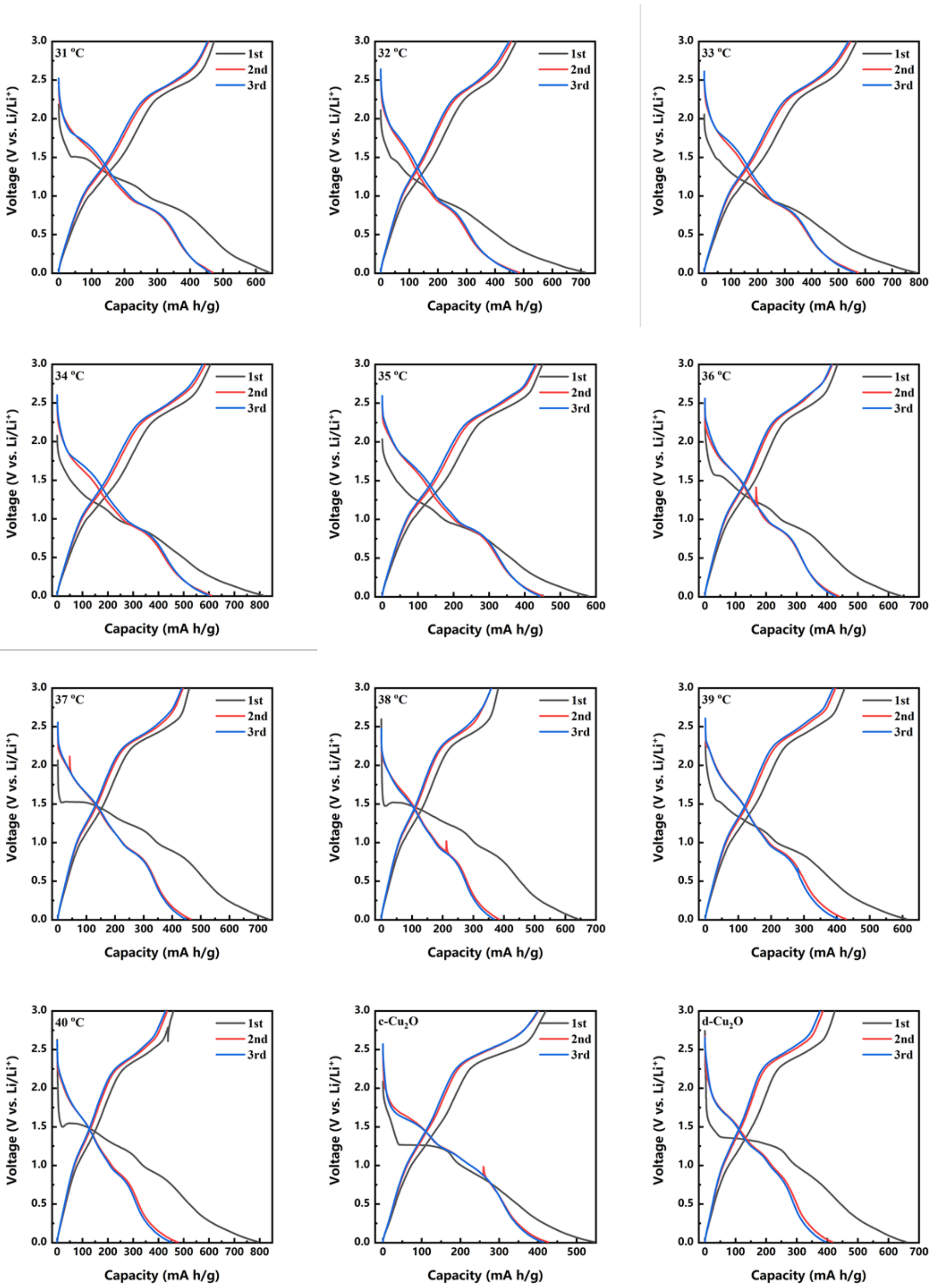

Figure S5. Discharge and charge curves of all the samples measured at current densities of 100 mA/g.

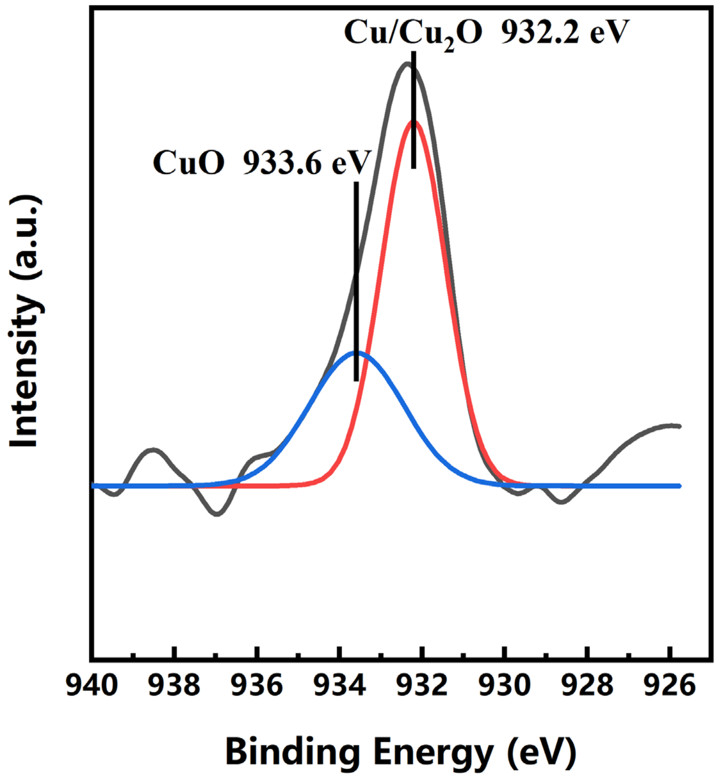

Figure S6. Typical deconvolution of XPS Cu $2p_{3/2}$ main peak.

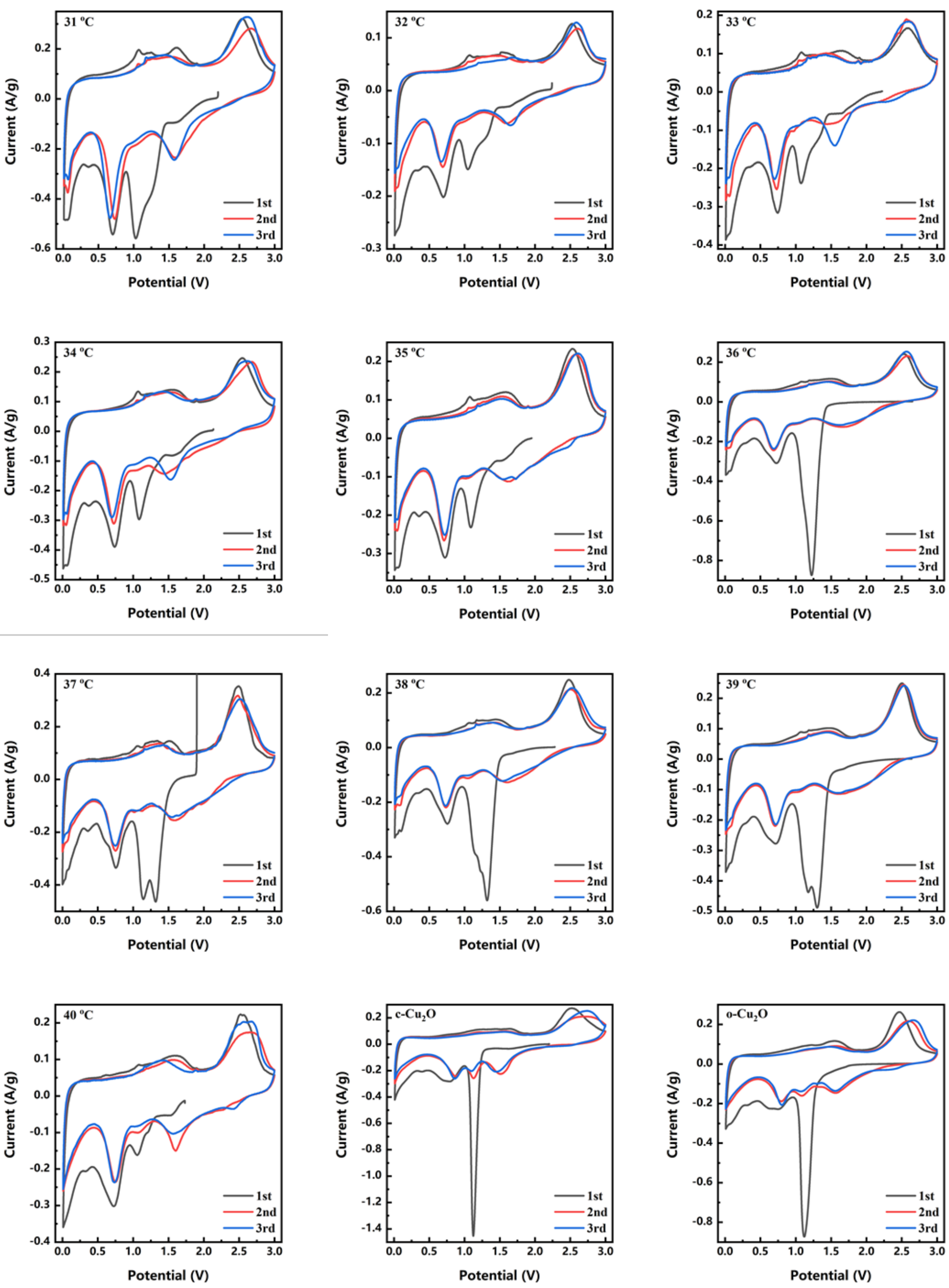

Figure S7. CV curves of d-Cu$_2$O synthesized at 31-40 ºC, c-Cu$_2$O and o-Cu$_2$O at a scan rate of 0.2 mV/s, and the potential range from 0.01-3.0 V (vs. Li$^+$/Li).

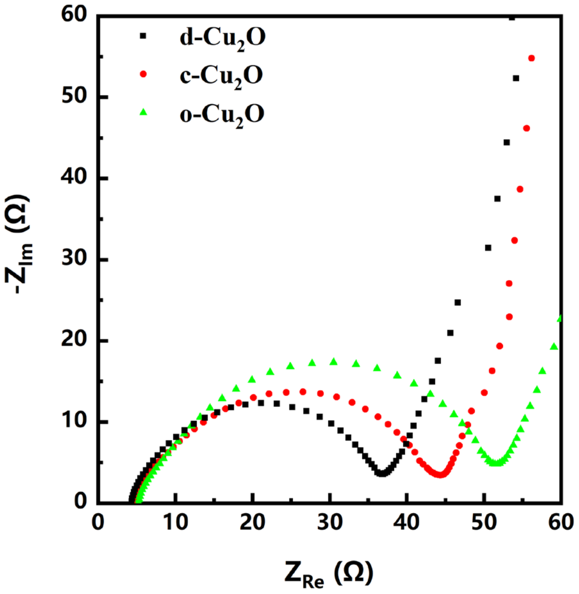

Figure S8. EIS of d-Cu$_2$O synthesized at 37 ºC, c-Cu$_2$O and o-Cu$_2$O