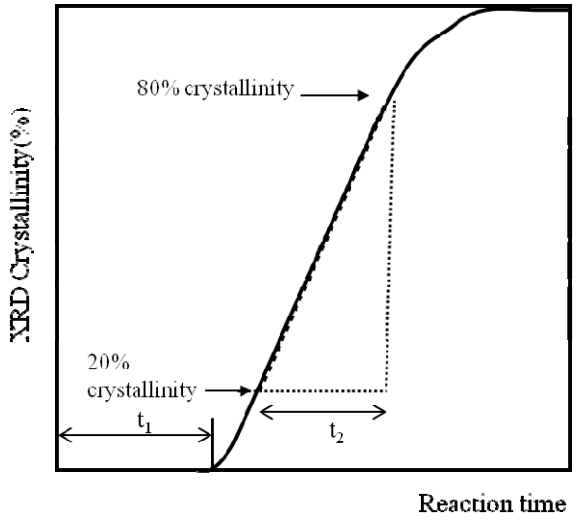
Supplementary Information (ESI):

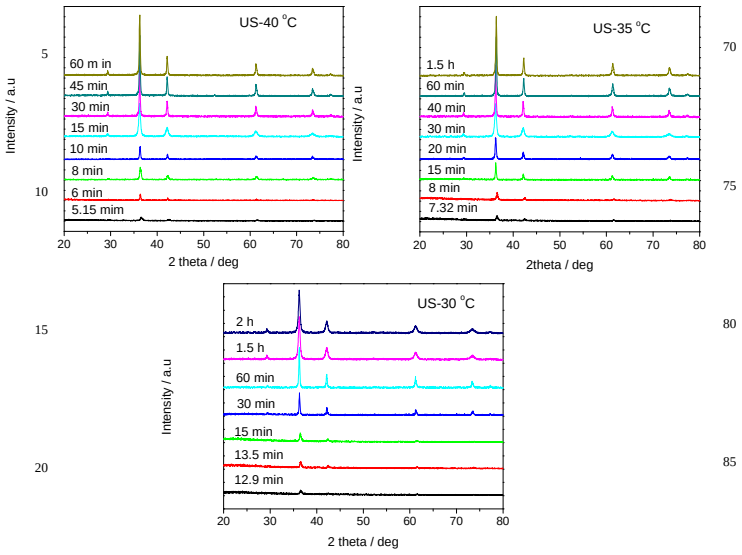
1. Calculation procedure of the rates of nucleation and crystal growth

The XRD intensity saturates at a certain time and does not change further with increased time. Moreover, the FWHM does not change with reaction time for a selected condition. Therefore, relative intensity can be used for crystallization curves. The XRD intensity may be changed with heating methods (such as CE, US and MW because of different crystal sizes) and temperatures; however, the saturated intensity (does not change with reaction time) at a specific condition may be used as the intensity of a pure crystalline material at that condition for various reaction times).

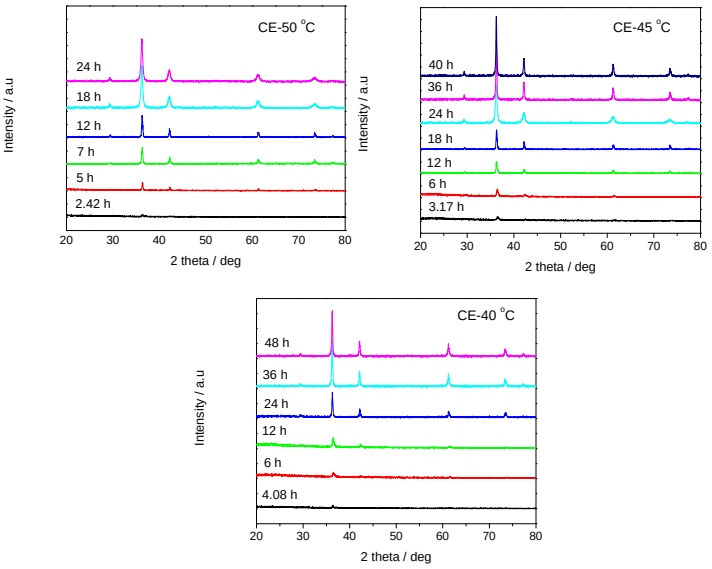
The relative rates of nucleation and crystal growth were estimated by the reciprocal of the induction period or the time required observing any crystallinity (XRD intensity of 0-5 % to the fully crystallized samples) and the slope of crystallization curve between 20 and 80% crystallinity, as shown in the following Scheme.



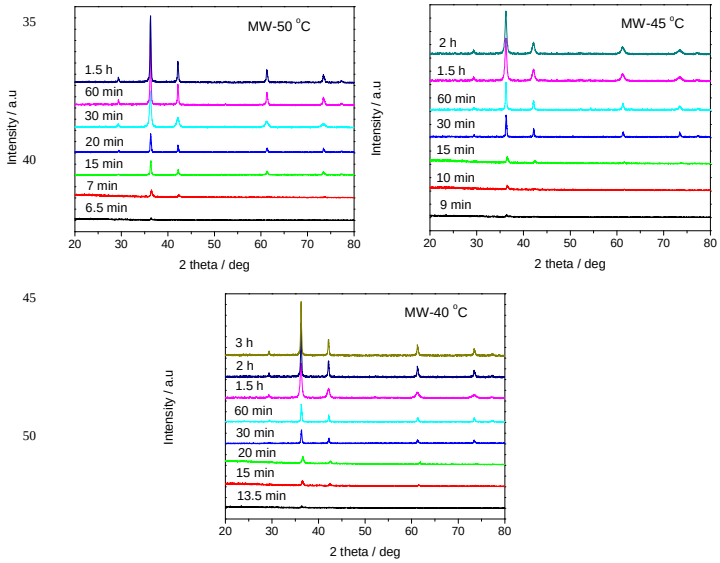
Scheme to represent a crystallization curve and the time scales used for the calculation of the relative speeds of nucleation and crystal growth. The relative speeds of nucleation and crystal growth were calculated from $1/t_1$ and slope of crystal growth rate between 20 and 80% conversion (proportional to $1/t_2$), respectively.



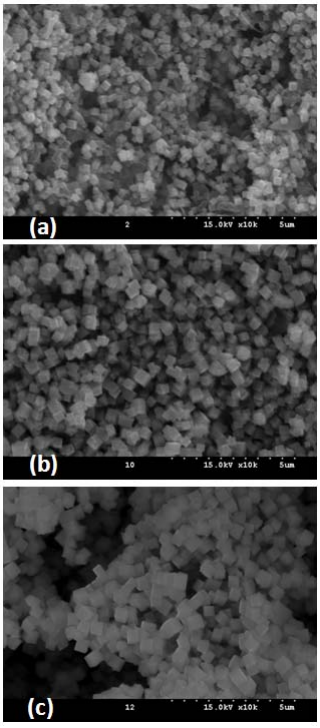
Supporting Figure S1. Changes of XRD patterns of Cu_2O with reaction temperatures and times by the US syntheses.



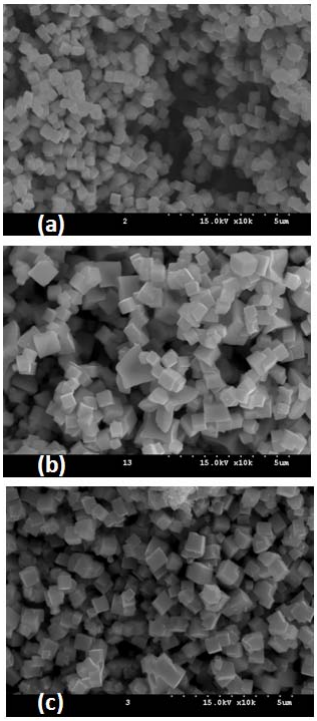
Supporting Figure S3. Changes of XRD patterns of Cu_2O with reaction temperatures and times by the CE syntheses.



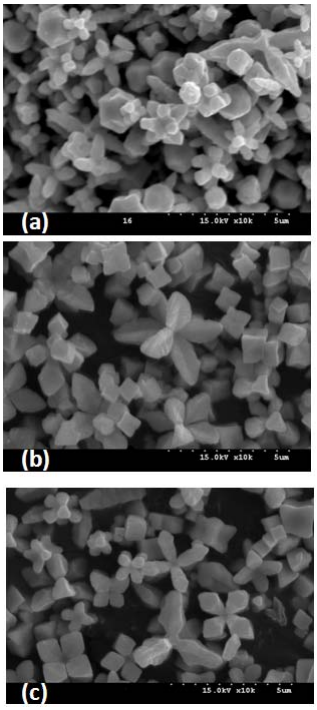
Supporting Figure S2. Changes of XRD patterns of Cu_2O with reaction temperatures and times by the MW syntheses.



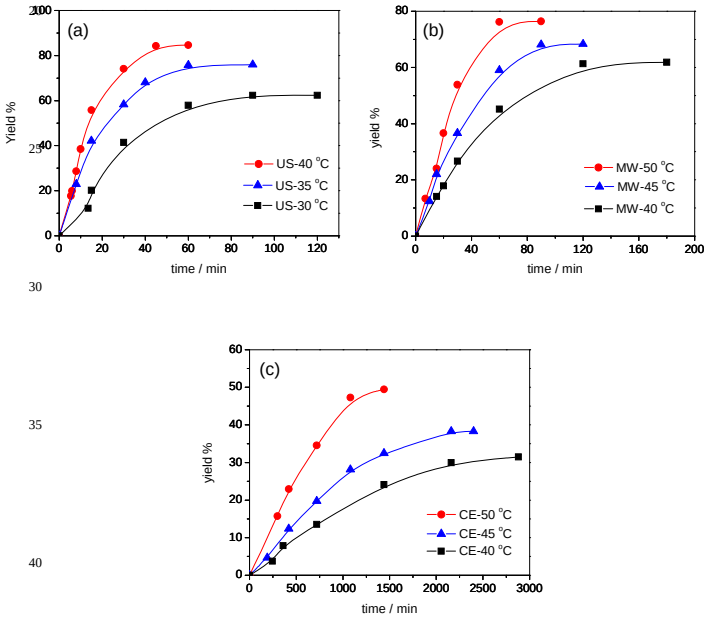
Supporting Figure S4. Typical SEM images of fully crystallized Cu_2O obtained by the US syntheses: (a) 90 min at 30 °C; (b) 60 min at 35 °C ; (c) 45 min at 40 °C.



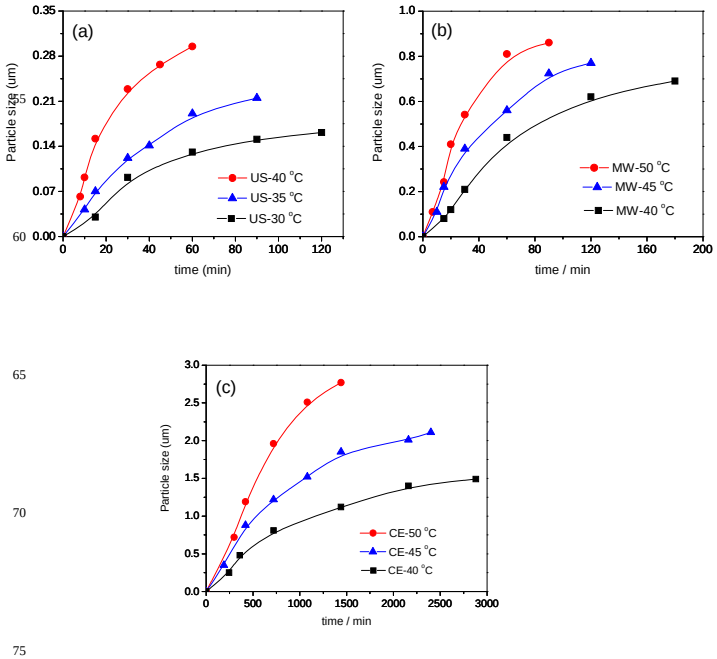
Supporting Figure S5. Typical SEM images of fully crystallized Cu_2O obtained by the MW syntheses: (a) 90 min at 40 °C; (b) 60 min at 45 °C ; (c) 45 min at 50 °C.



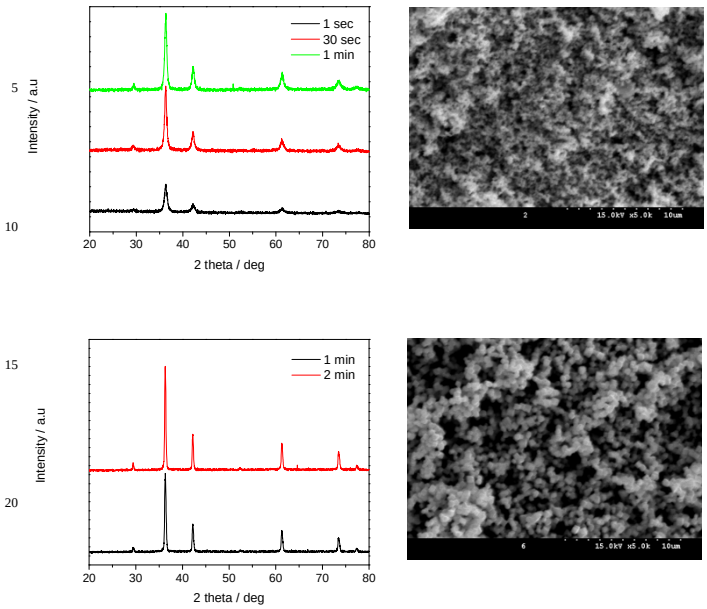
Supporting Figure S6. Typical SEM images of fully crystallized Cu_2O obtained by the CE syntheses: (a) 2 d at 40 °C; (b) 1.5 d at 45 °C; (c) 1 d at 50 °C



Supporting Figure S7. Changes of crystallization yields of Cu_2O with reaction temperatures and times: (a) Synthesis under US; (b) Synthesis under MW; (c) Synthesis under CE.



Supporting Figure S8. Changes of particle size of Cu_2O with reaction temperatures and times: (a) Synthesis under US; (b) Synthesis under MW; (c) Synthesis under CE



Supporting Figure S9. Typical XRD patterns and SEM images of Cu_2Os synthesized in various times at 80 ^oC: (upper) Synthesized with US; (lower) Synthesized with MW. Upper and lower SEMs correspond to the samples obtained in 30 sec (with US) and 1 min (with MW), respectively. The US irradiation was started as soon as the reaction temperature was reached to 80 ^oC