Electronic Supplementary Material (ESI) for CrystEngComm.

Supporting information

A facile one-pot synthesis of Cu-Cu_2O concave cube hybrid architectures

Caijin Huang, Zhen Long, Masahiro Miyauchi,* and Xiaoqing Qiu*

***To whom correspondence should be addressed**

mmiyauchi@ceram.titech.ac.jp (M.M.), qiuxq@fzu.edu.cn (X.Q.)

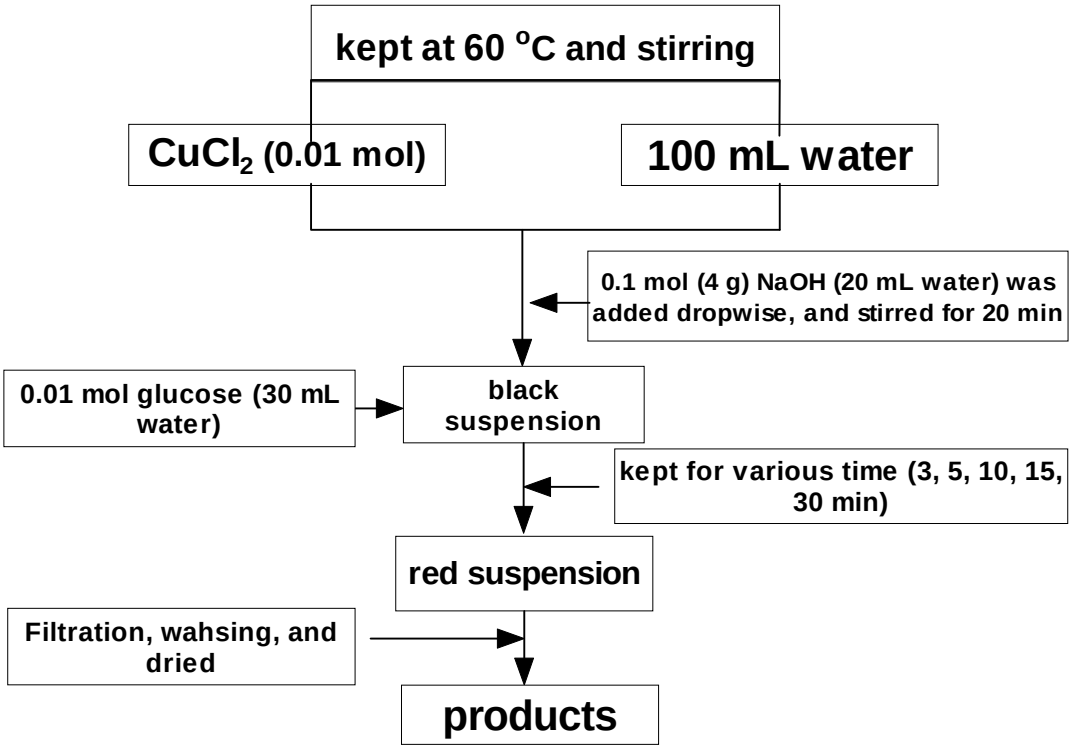


Fig. S1. The experiment procedure of Cu-Cu_2O concave cube hybrid architectures via a facile one-pot solution method.

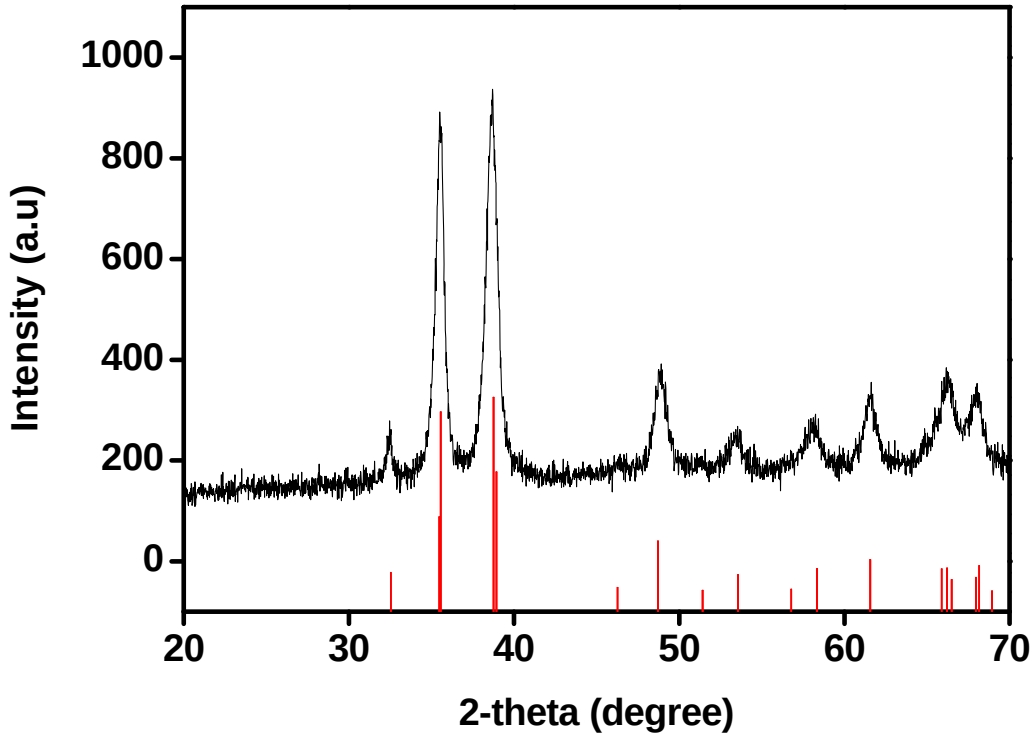


Fig. S2. XRD pattern of the black precursor.

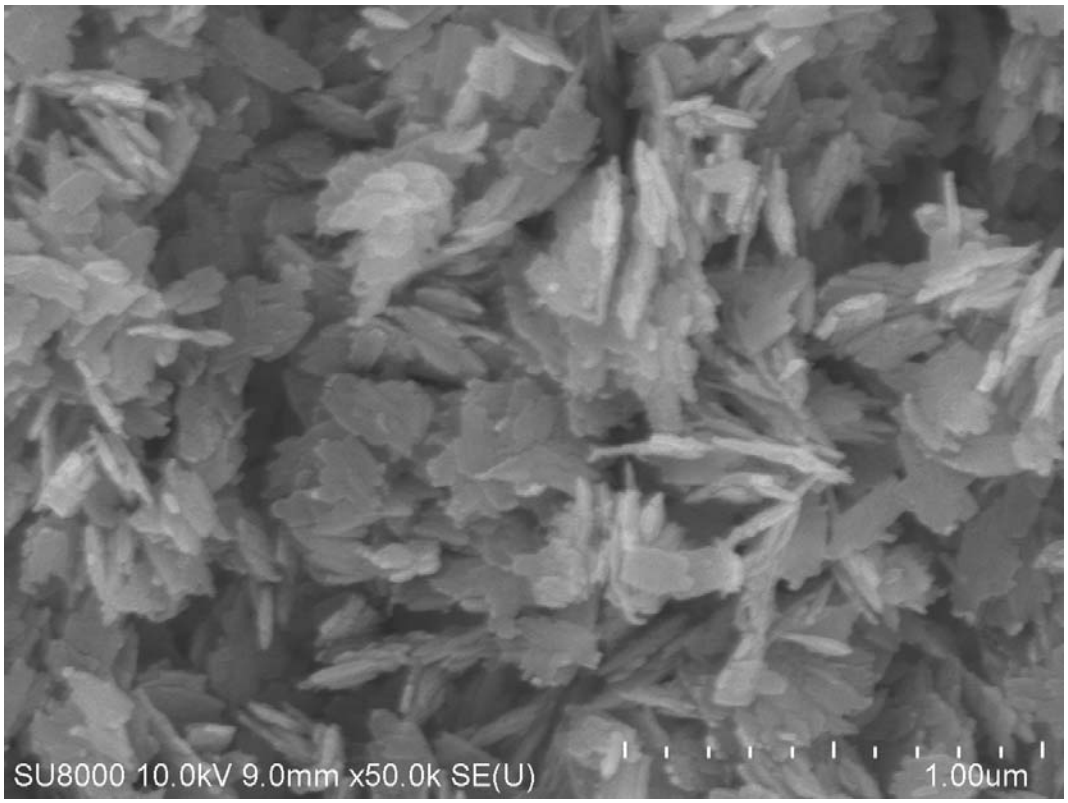


Fig. S3. SEM image of the the black precursor.

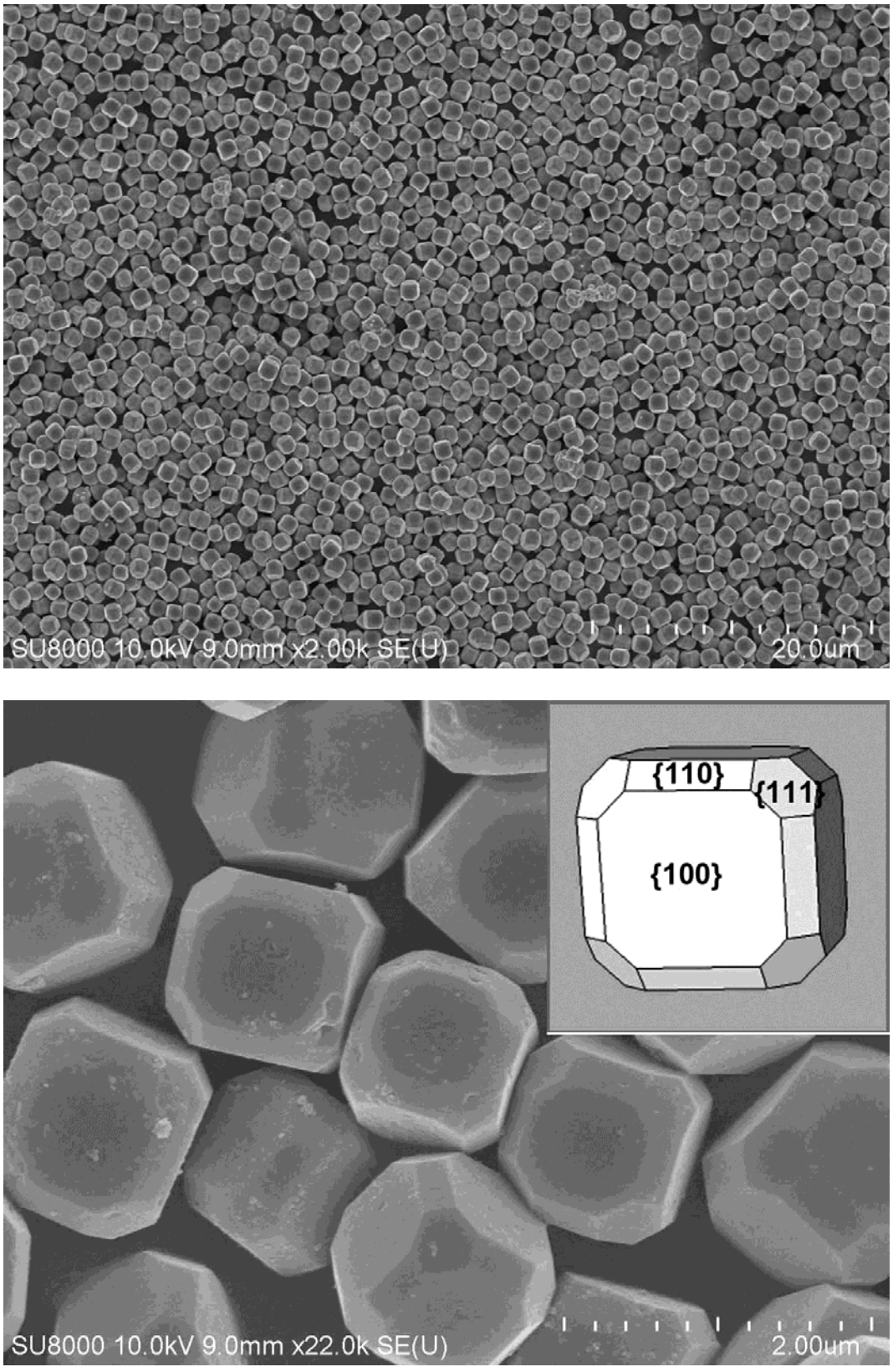
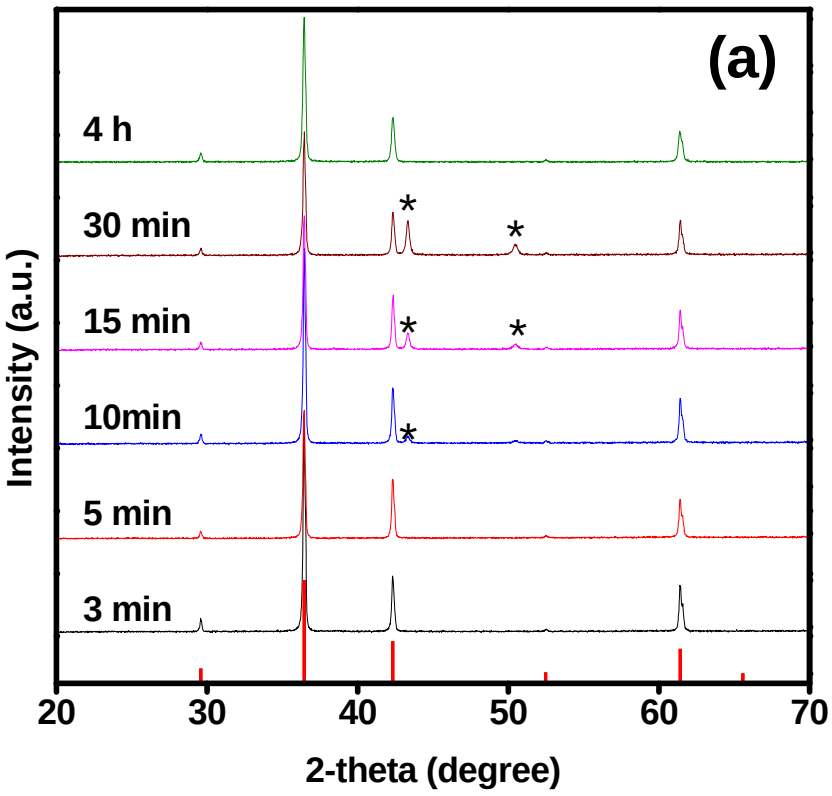


Fig. S4. SEM image of the sample obtained from the reaction mixture after reaction with glucose at 60 ^{o}C for 3min.



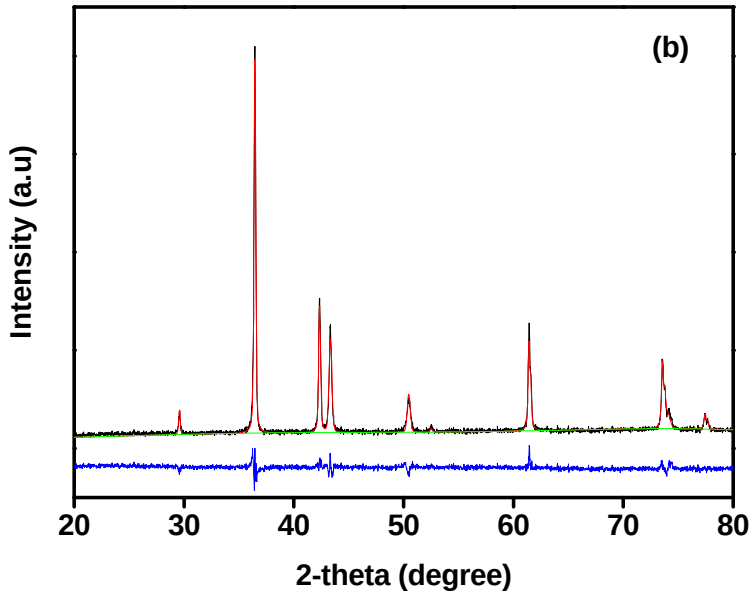
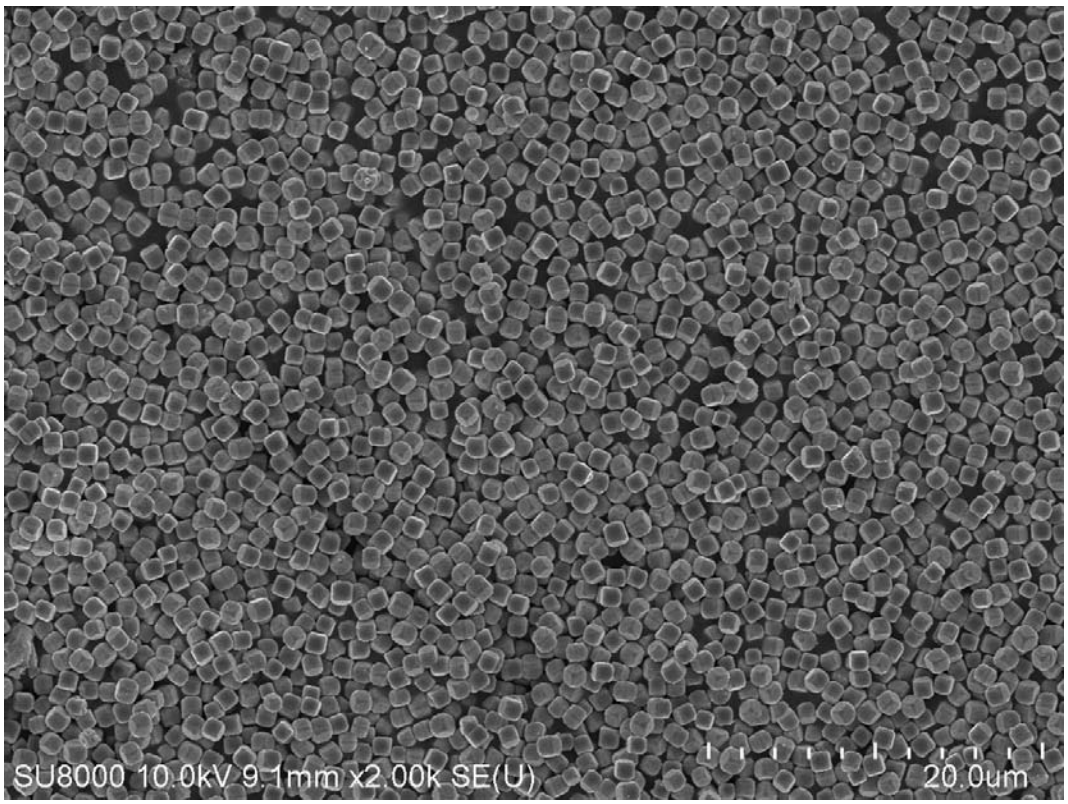


Fig. S5. (a) XRD patterns of the sample obtained from the reaction mixture after reaction with glucose at 60 ^{o}C for various time. For comparison, vertical bars below

the patterns represent the standard diffraction data from JCPDS file for bulk Cu_2O (No. 77-0199). The asterisk (*) represents the metallic Cu. (b) XRD pattern of Cu-Cu_2O concave cube hybrid architectures (obtained after 30 min reaction with glucose) refined with the GSAS software, where the black line is for the raw data, the red line is for the calculated values, the blue line is the difference. The relative metallic Cu content in the hybrid architectures is calculated to be 27.6 wt%. Furthermore, the relative metallic Cu contents in the Cu-Cu_2O concave cube hybrid architectures obtained after 10 and 15 min reaction with glucose were also calculated to be 5.3% and 13.2 %.



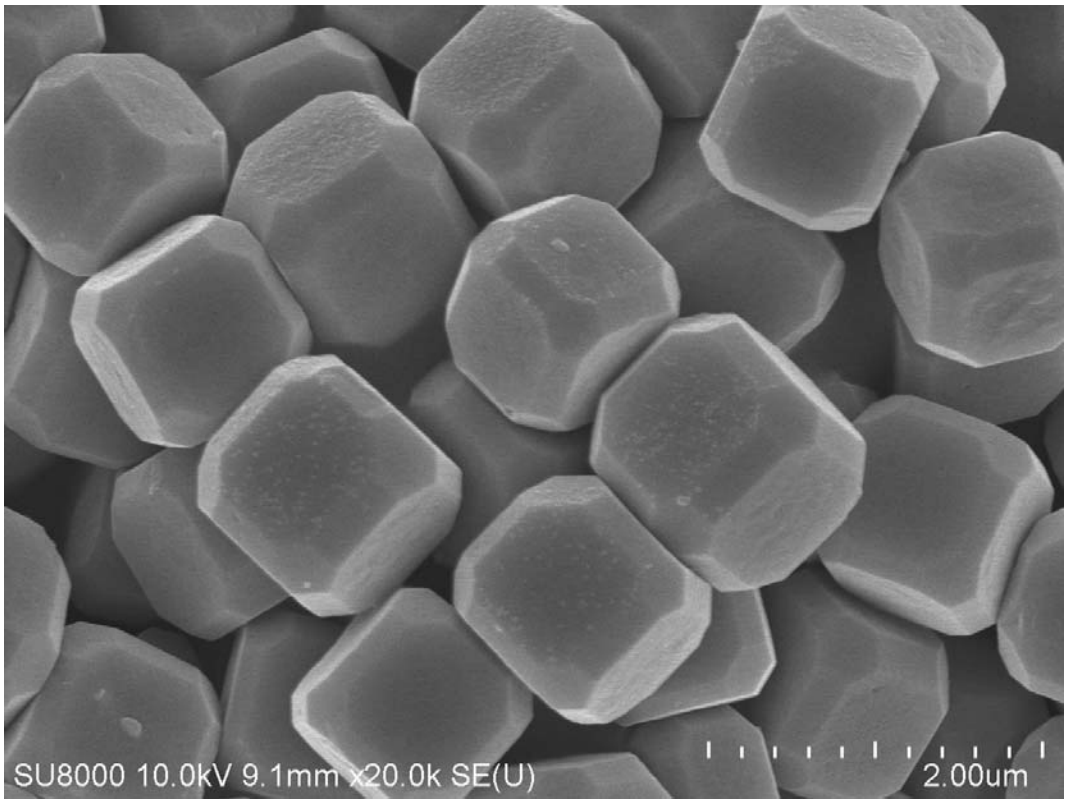


Fig. S6. SEM image of the sample obtained from the reaction mixture after reaction with glucose at 60 ^{o}C for 5 min.

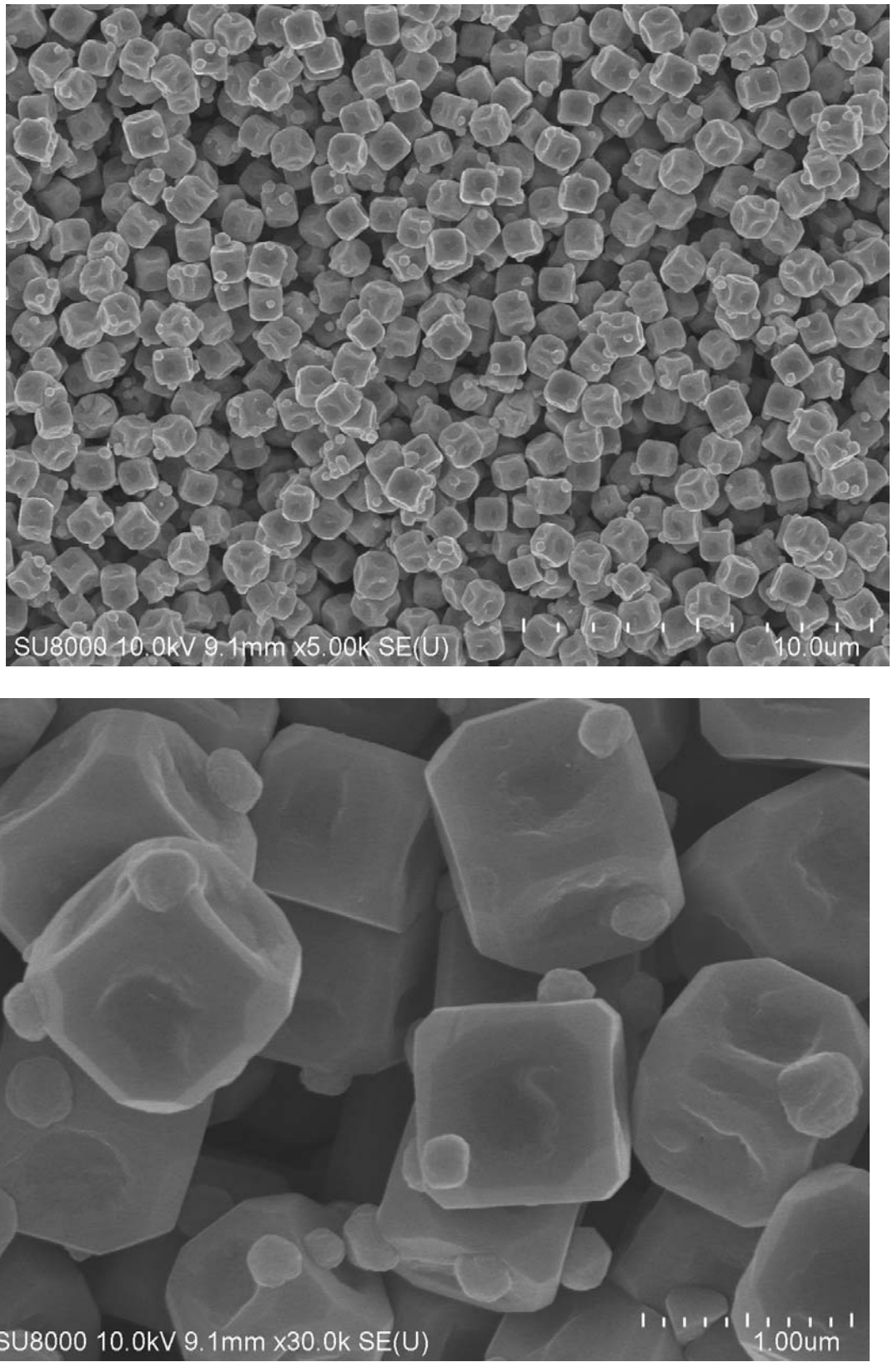


Fig. S7. SEM image of the sample obtained from the reaction mixture after reaction with glucose at 60 ^{o}C for 10 min.

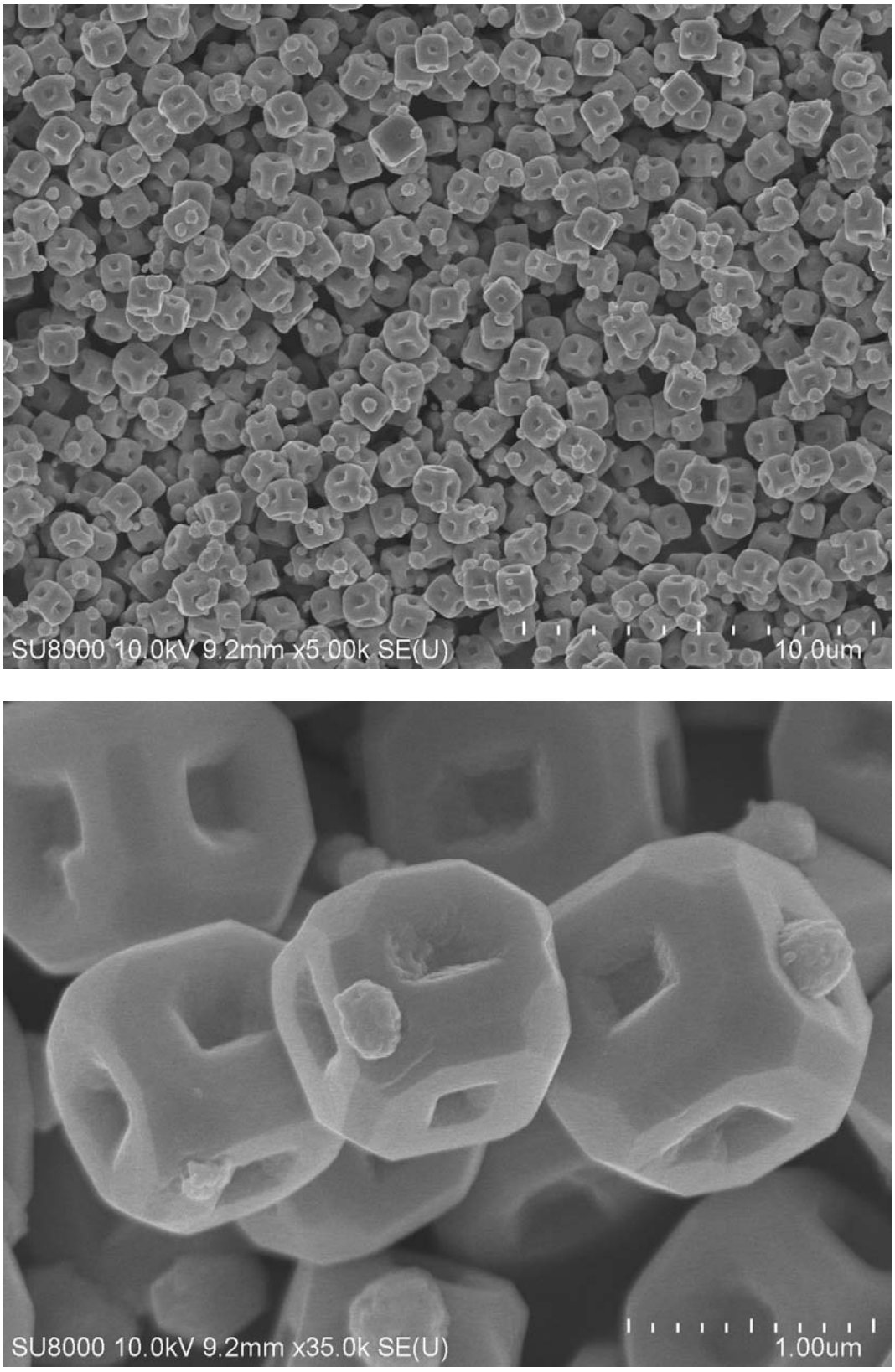


Fig. S8. SEM image of the sample obtained from the reaction mixture after reaction with glucose at 60 ^{o}C for 15 min.

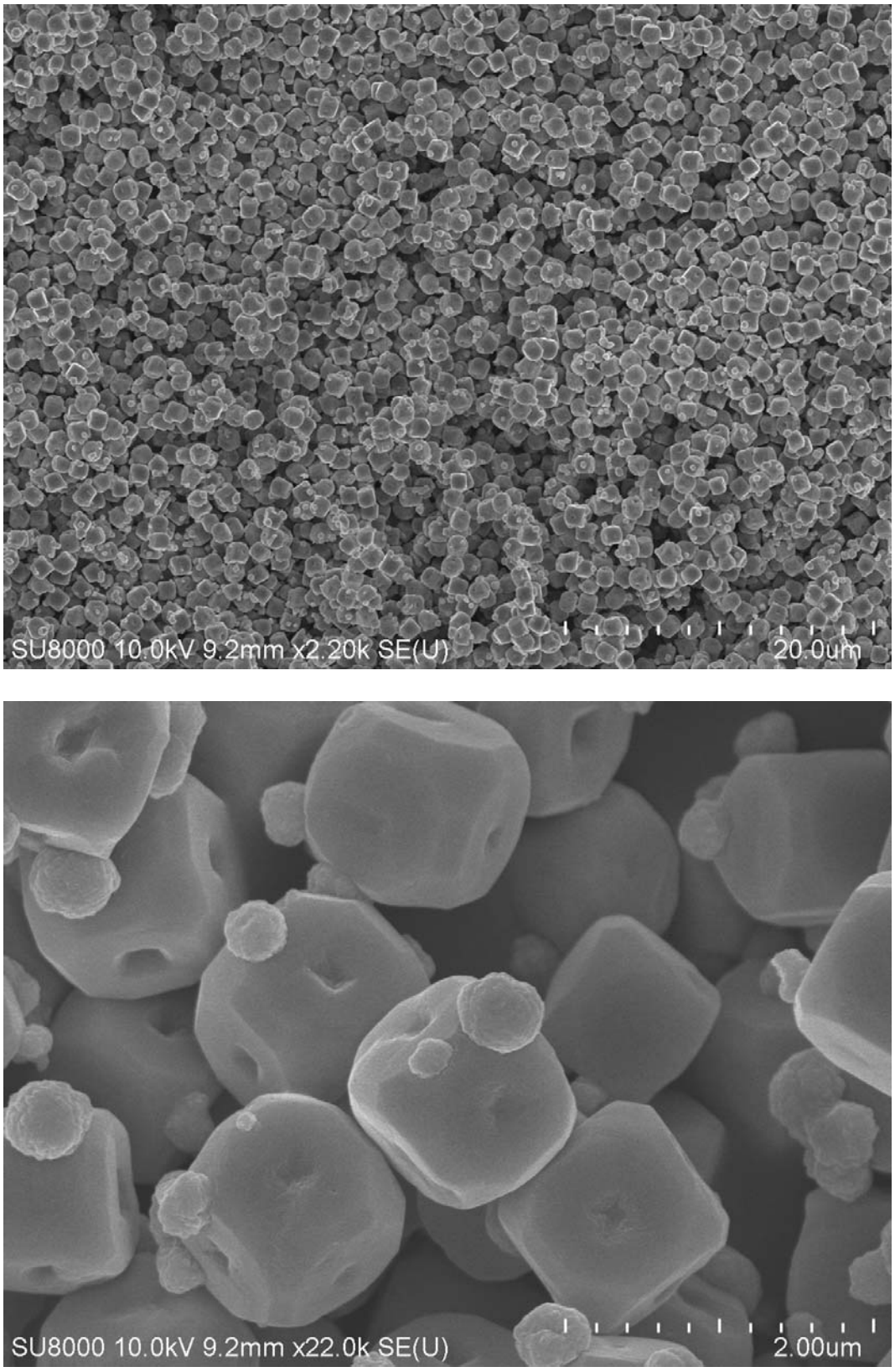


Fig. S9. SEM image of the sample obtained from the reaction mixture after reaction with glucose at 60 ^{o}C for 60 min.

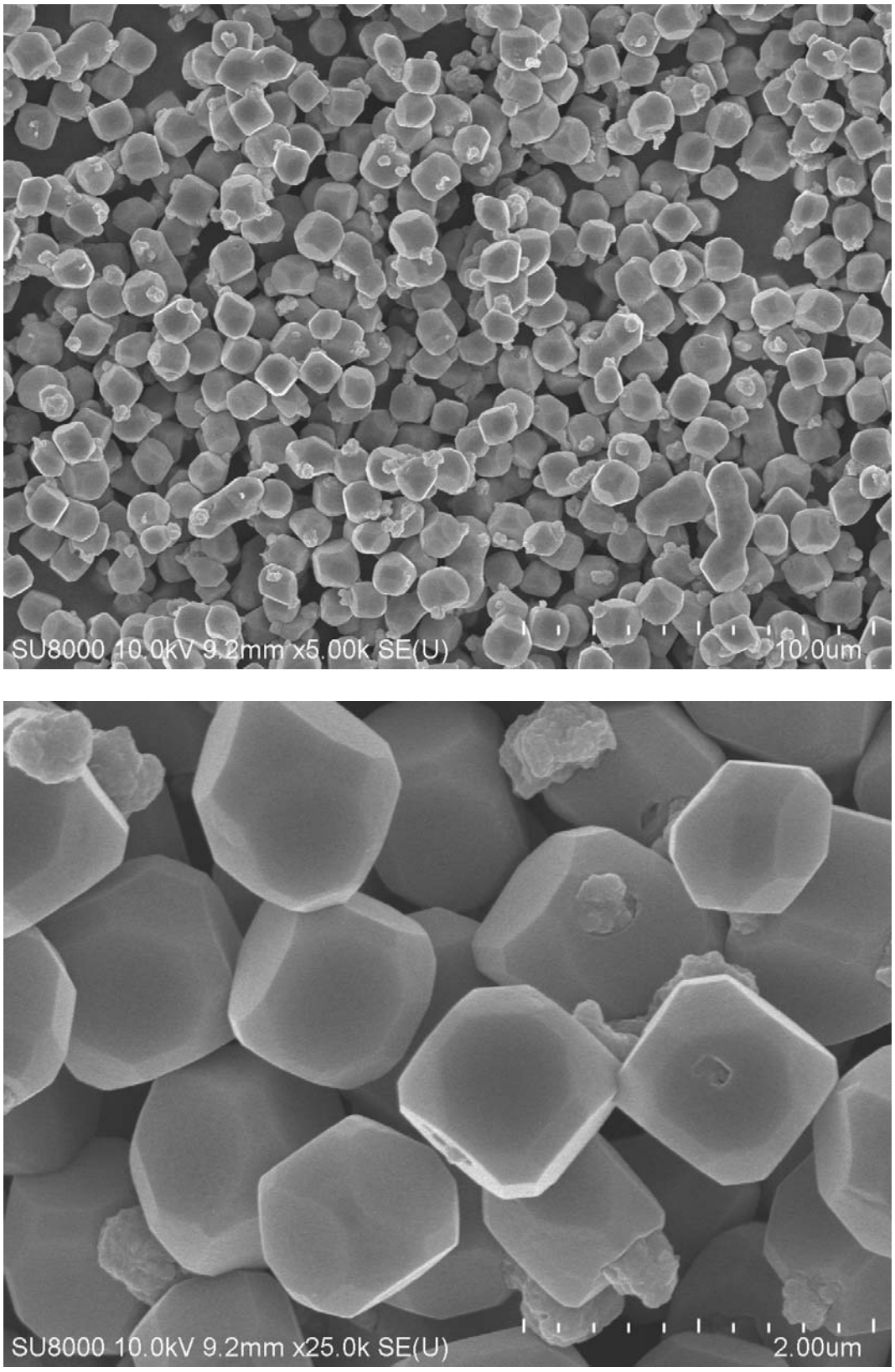


Fig. S10. SEM image of the sample obtained from the reaction mixture after reaction with glucose at 60 ^{o}C for 2 h.

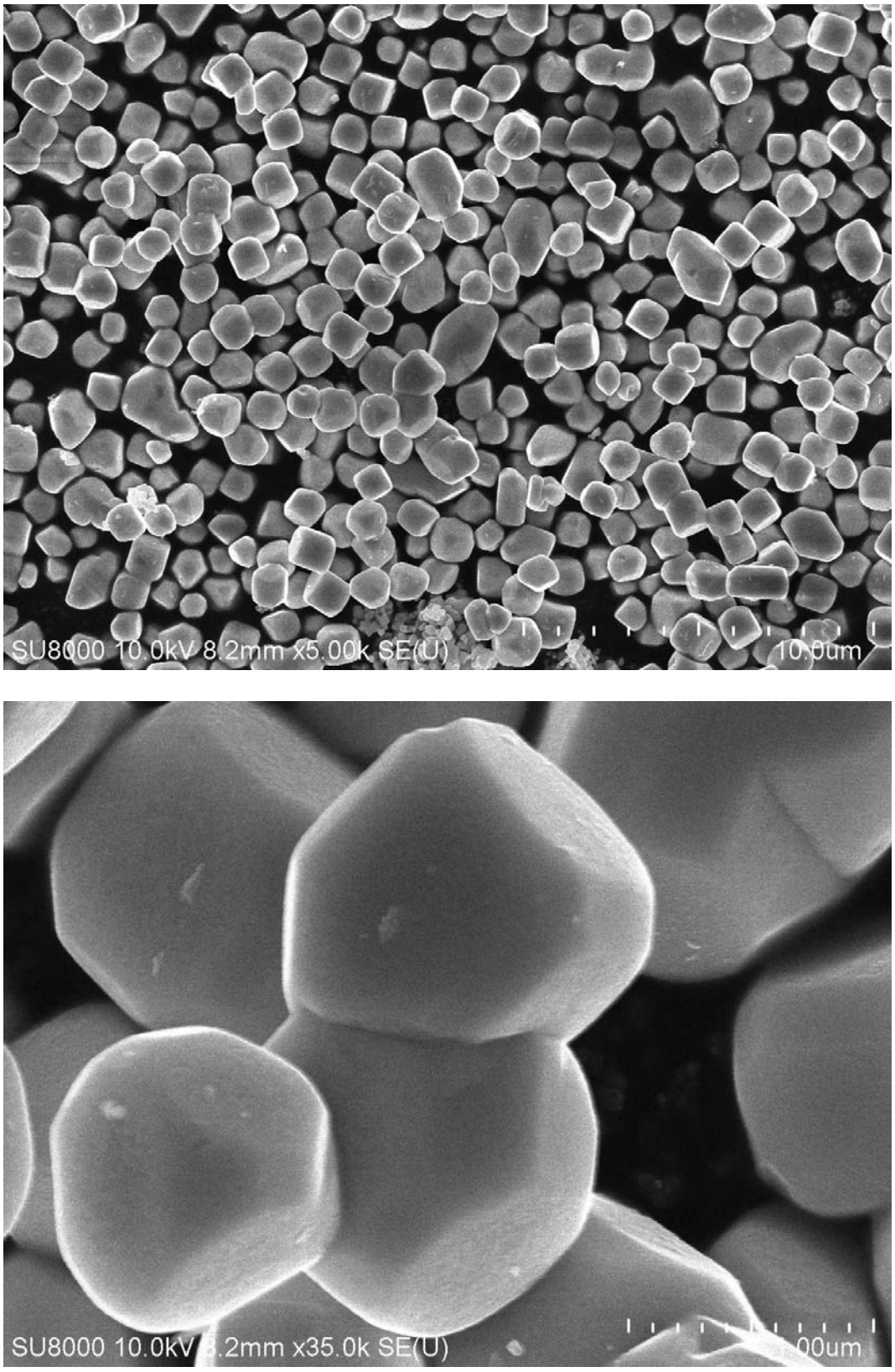


Fig. S11. SEM image of the sample obtained from the reaction mixture after reaction with glucose at 60 ^{o}C for 4 h.

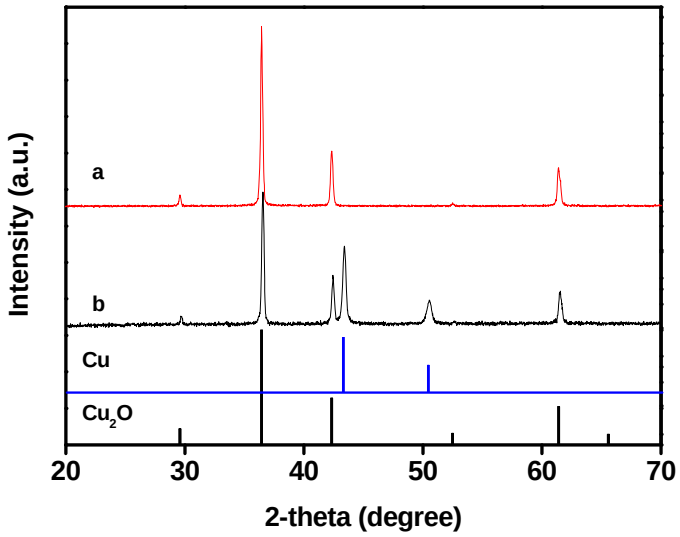


Fig. S12. XRD patterns of the sample obtained from the reaction mixture after reaction with glucose at 60 ^{o}C for 4h. (a) without N_2 protection, (b) under N_2 protection. Vertical bars below the patterns represent the standard diffraction data from JCPDS file for bulk Cu_2O (No. 77-0199) and bulk metallic Cu (No. 85-1326).

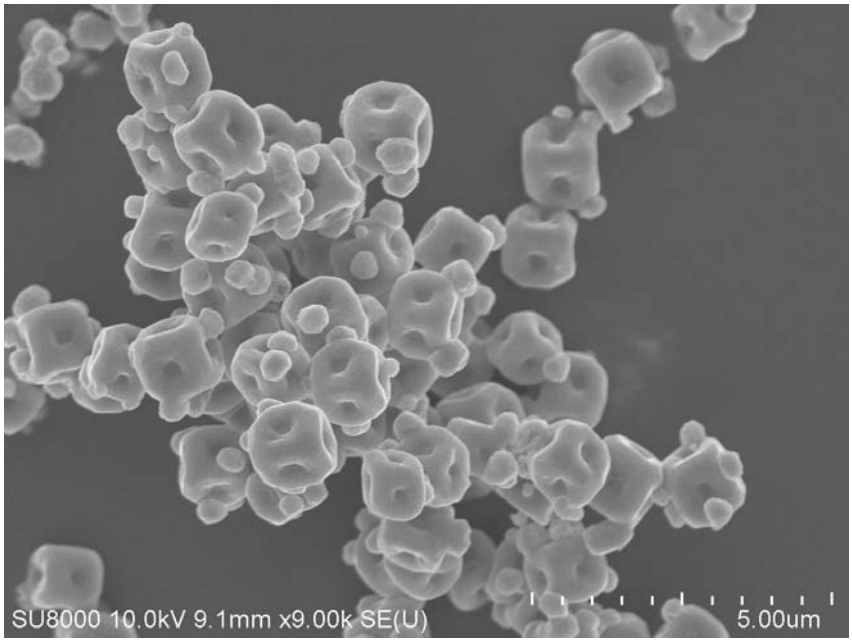


Fig. S13. SEM image of the sample obtained from the reaction mixture after reaction with glucose at 60 ^{o}C for 4 h under N_2 protection.

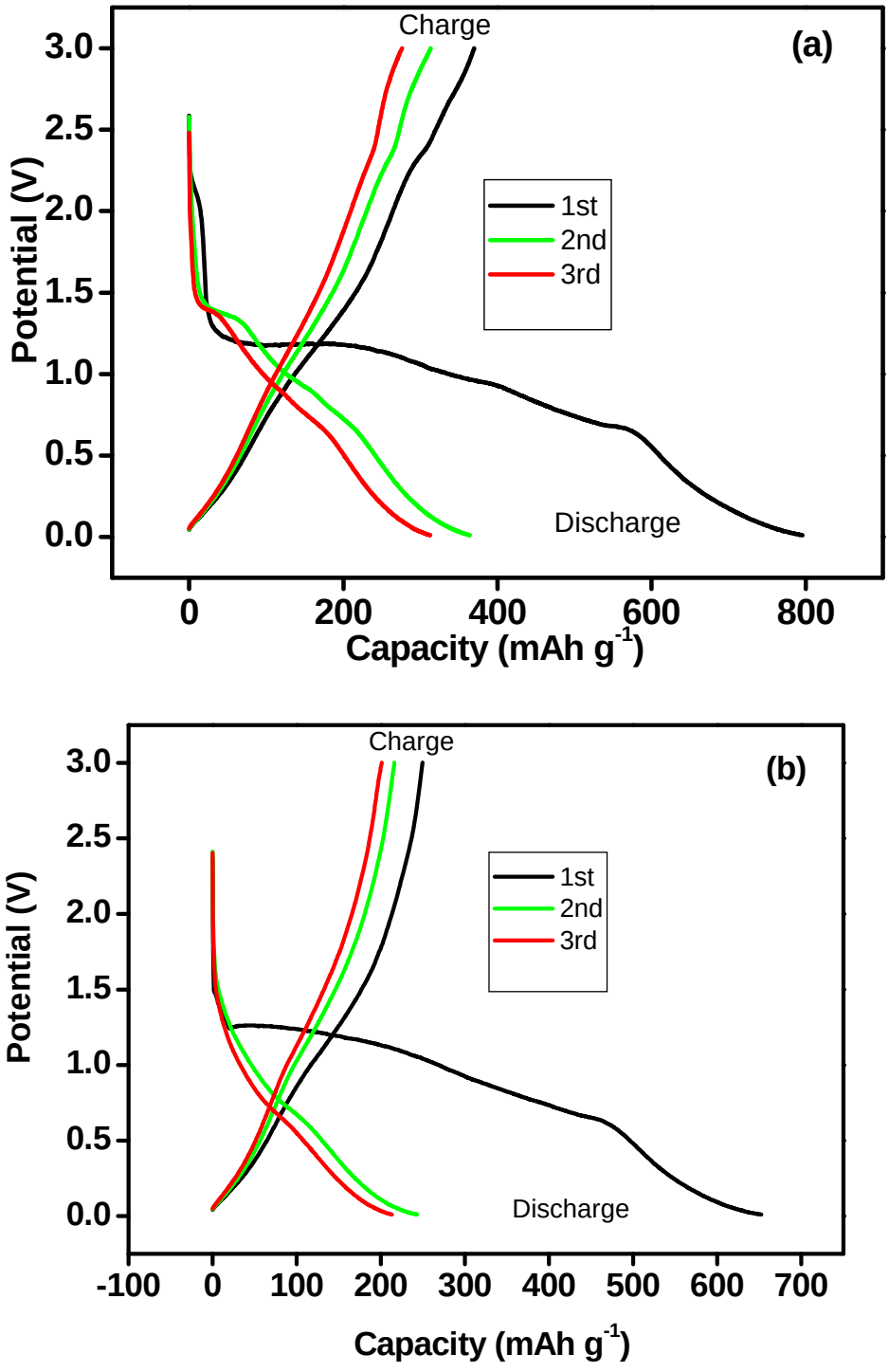


Fig. S14. The discharge-charge curves for (a) for truncated Cu2O cubes and (b) irregular Cu_2O.

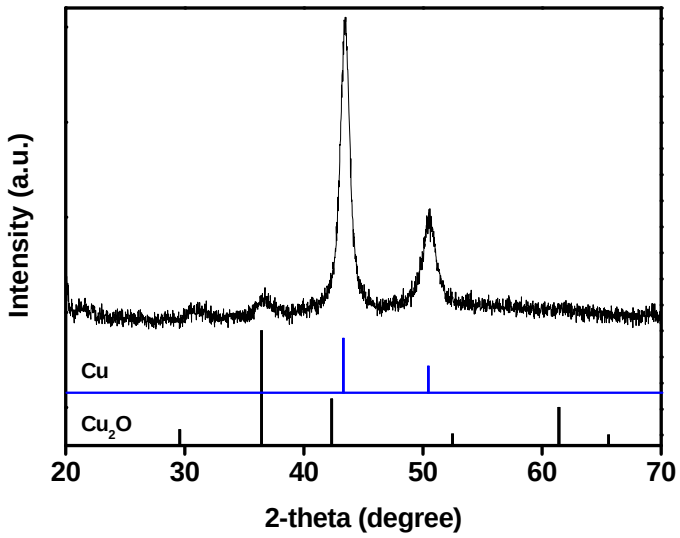


Fig. S15. Ex situ XRD pattern of Cu-Cu_2O hybrid electrode after the 5^{th} cycle. Vertical bars below the patterns represent the standard diffraction data from JCPDS file for bulk Cu_2O (No. 77-0199) and bulk metallic Cu (No. 85-1326)

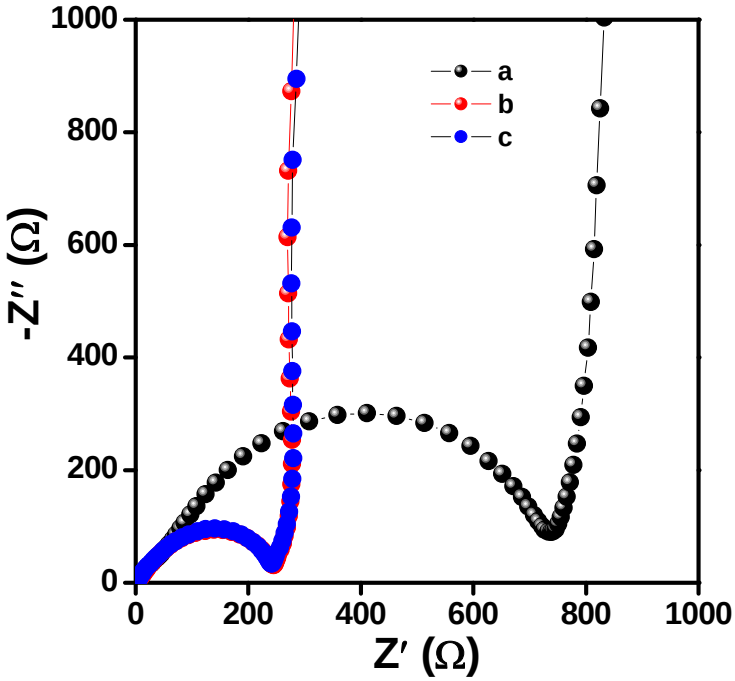


Fig. S16. Electrochemical impedance spectra of the electrodes. (a) pure Cu_2O crystals, (b) the Cu-Cu_2O concave cube hybrid architectures with 5.3 % Cu content, (c) the Cu-Cu_2O concave cube hybrid architectures with 27.6 % Cu content.