

Supporting Information

Growth of Ga₂O₃ Nanowires via Cu-As-Ga Ternary Phase Diagram

Hang Wang^{1,2,*}, Ying Wang^{2,3,*}, Shuyan Gong², Xinyuan Zhou², Zaixing Yang⁴, Jun Yang^{1*}, Ning Han^{2,3*}, and Yunfa Chen^{2,3*}

¹ School of Metallurgical Engineering, Xi'an University of Architecture and Technology, Xi'an 710055, P. R. China

² State Key Laboratory of Multiphase Complex Systems, Institute of Process Engineering, Chinese Academy of Sciences, Beijing 100190, P. R. China

³ Center for Excellence in Regional Atmospheric Environment, Institute of Urban Environment, Chinese Academy of Sciences, Xiamen 361021, P. R. China

⁴ Center of Nanoelectronics and School of Microelectronics, Shandong University, Jinan 250100, P. R. China

*Correspondence: yj-yangjun@xauat.edu.cn, Tel.: 86-13152420820; nhan@ipe.ac.cn, Tel.: +86-010-6255-8356; chenyf@ipe.ac.cn;

Synthesis of Cu₂O nanoparticles: a NaOH aqueous solution (25.0 mL, 1.5 M) was added to an aqueous solution of CuSO₄ (100.0 mL, 0.01 M) under magnetic stirring at room temperature. After stirring for >1 min, blue Cu(OH)₂ sol is formation. In this blue sol, ascorbic acid (AA) aqueous solution with a concentration of 0.1M and 25 ml was added rapidly, and stirred at room temperature for 15-30 minutes. The solution gradually turned to orange-red precipitation. Subsequently, the as obtained product was centrifuged and washed several times with deionized water and ethanol to remove the residual inorganic ions, and finally dried in vacuo at 80°C overnight. Other Cu₂O particle sizes samples were obtained by changing the concentration of added NaOH. Specific test conditions are as follows table S1.

Table S1. Synthesis conditions of Cu₂O using ascorbic acid as reductive agent.

Number	CuSO ₄ (M)	AA(M)	NaOH(M)	Cu ₂ O Sizes(nm)
1	0.01	0.1	0.25	25.36
2	0.01	0.1	0.5	33.25
3	0.01	0.1	0.6	51.47
4	0.01	0.1	0.75	99.52
5	0.01	0.1	0.8	177.63

Table S2. Catalyst size, NW diameter and corresponding standard deviation

Cu₂O size (nm)	25.36	33.25	51.47	99.52	177.63
Standard Deviation	4.17	6.49	10.04	17.68	22.86
NW diameter(nm)	18.82	24.33	39.69	69.87	67.704
Standard Deviation	5.65	5.46	8.24	19.82	21.49

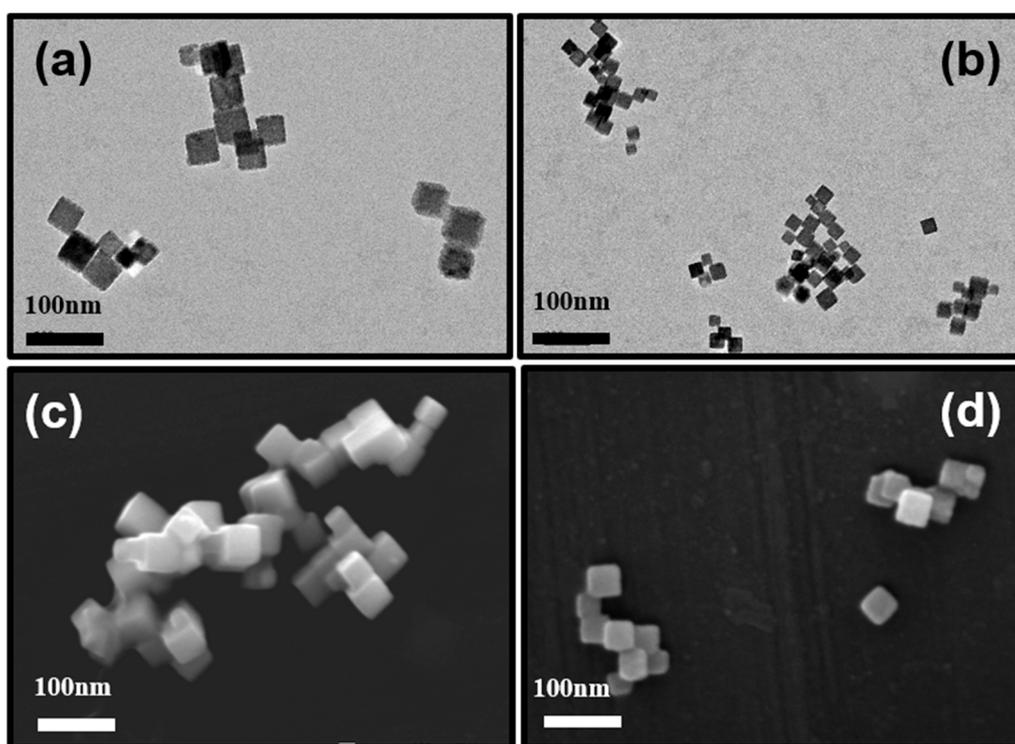


Figure S1 The broad views of several different sizes Cu₂O cubes synthesized by chemical methods. (a) 51nm and (b) 25nm are TEM images, (c) and (d) are corresponding SEM images.

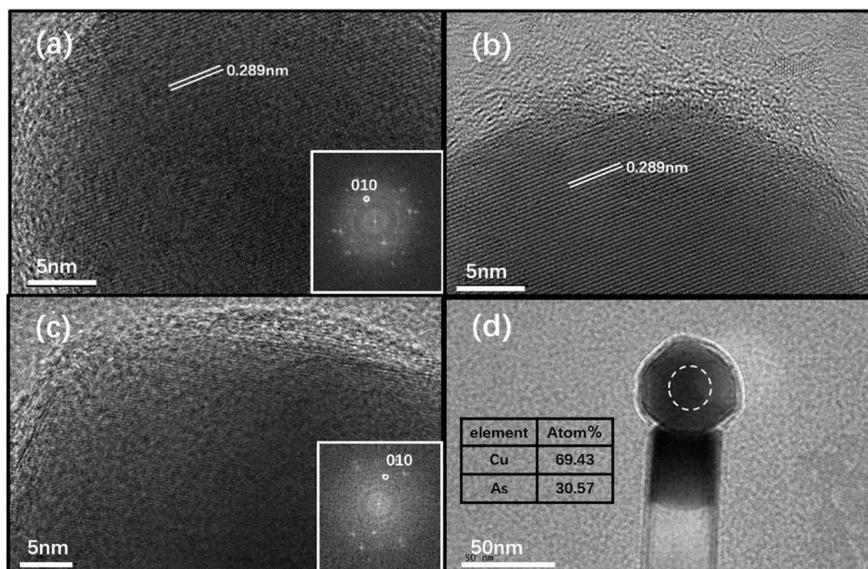


Figure S2a-c: HRTEM of catalyst heads of different Ga₂O₃ NWs and d is the TEM image and elemental atomic ratio of tip.