Electronic Supplementary Material (ESI) for Analytical Methods.

Supporting Information

The formation principle of Cu_2O: The kinetics of crystal growth shows that the morphological change of crystal growth comes from the change of the relative growth rate of each crystal plane. The crystal face with a lower growth rate will eventually form an exposed face, and the crystal face with a higher growth rate will disappear during crystal growth. During the product preparation process, the following reactions may exist, as shown in formula S1. Copper ions are reduced to Cu^+ by ascorbic acid, and Cu^+ is hydrolyzed under alkaline conditions to eventually produce Cu_2O. Since the ascorbic acid solution is dropwise added during the reaction, the rate of Cu^+ formation is relatively slow, that is, the Cu^+ supersaturation in the solution is low. At this time, the crystal nucleus mainly grows in a two-dimensional nucleation growth mode. As shown in Fig. S2, the growth rate of the Cu_2O (111) crystal plane is relatively large, and the growth rate of the (100) crystal plane is relatively small. Finally, the (111) face disappeared, and the (100) face was exposed, resulting in cubic cuprous oxide[1].

[1] J.M. Song, X.X. Zhang, J. Jiao, et al, Preparation of cubic and spherical cuprous oxide and its photocatalytic properties. Chinese Journal of Applied chemistry. 27 (2010):1328-1333.

$$C_6H_8O_6(ascorbic\ acid) + 2Cu^{2+} + 2OH^- = C_6H_6O_6 + 2Cu^{2+} + 2H_2O$$

$$Cu^+ + OH^- = CuOH$$

$$2CuOH = Cu_2O + H_2O \qquad \text{(Formula S1)}$$

Formula S1. The formation mechanism of Cu_2O.

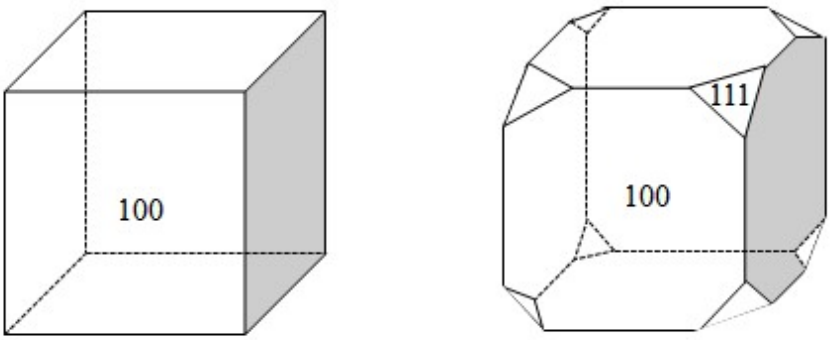

Fig. S2. The change of Cu_2O nucleus growth morphology.

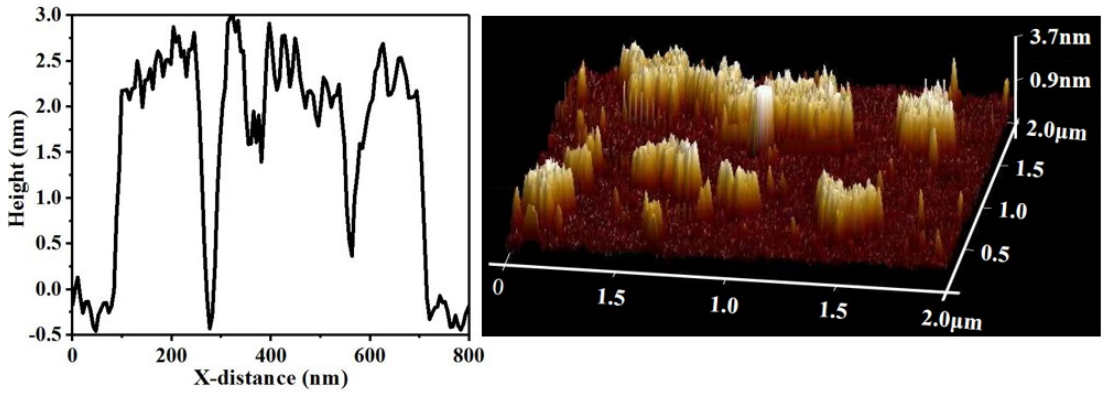

Fig. S3. AFM height profile of the NH_2-Cu-MOF surface.