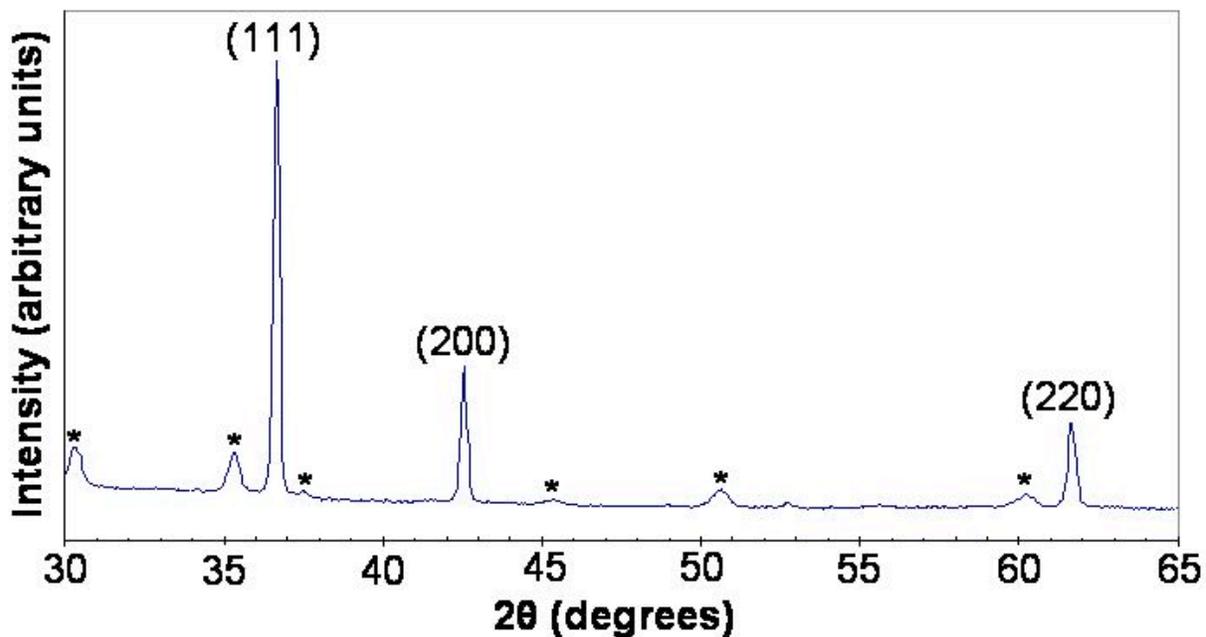


**Elucidating the Effect of Additives on the Growth and Stability of  
Cu<sub>2</sub>O Surfaces via Shape Transformation of Pre-Grown Crystals**

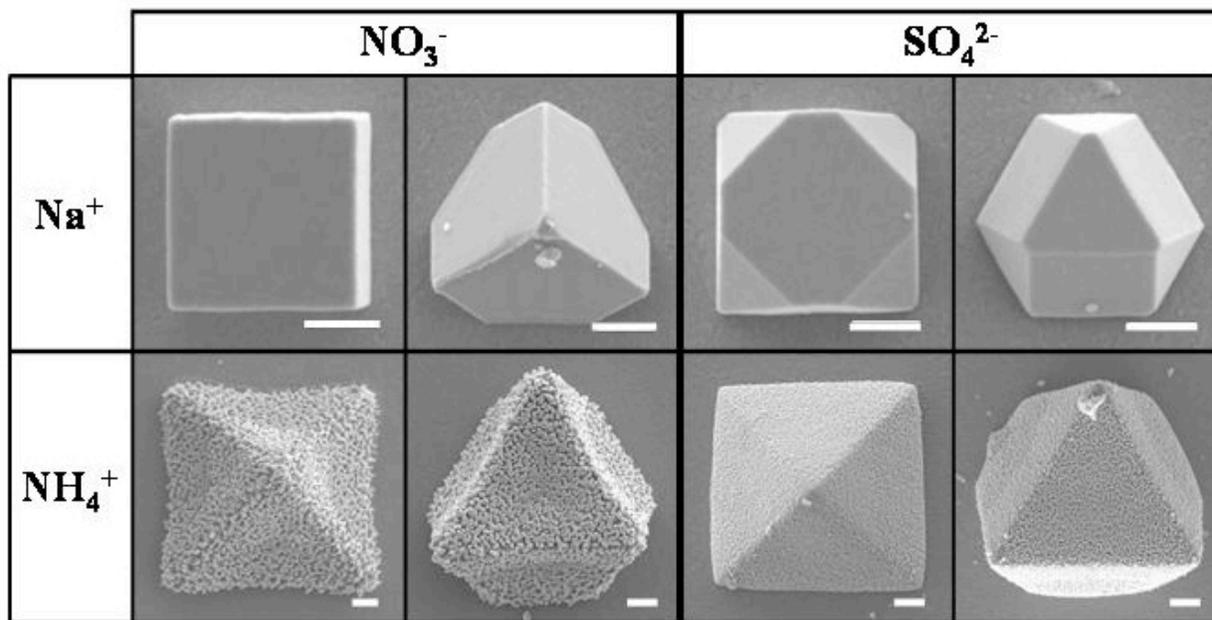
Matthew J. Siegfried and Kyoung-Shin Choi

*Purdue University, Department of Chemistry, West Lafayette, Indiana 47907*

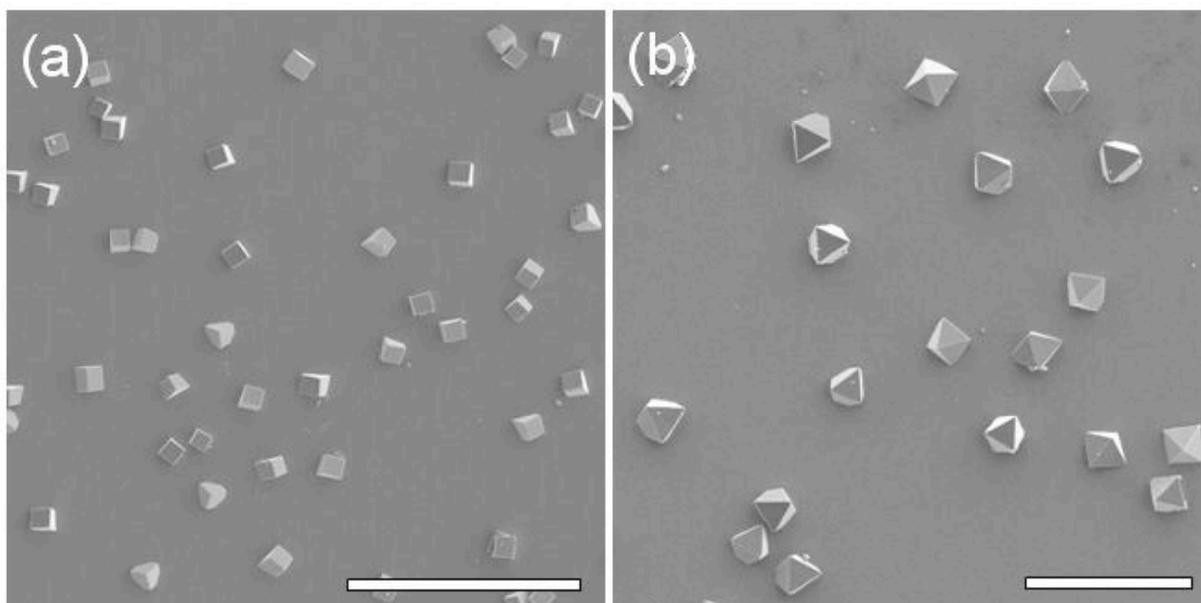
**Supporting Information**



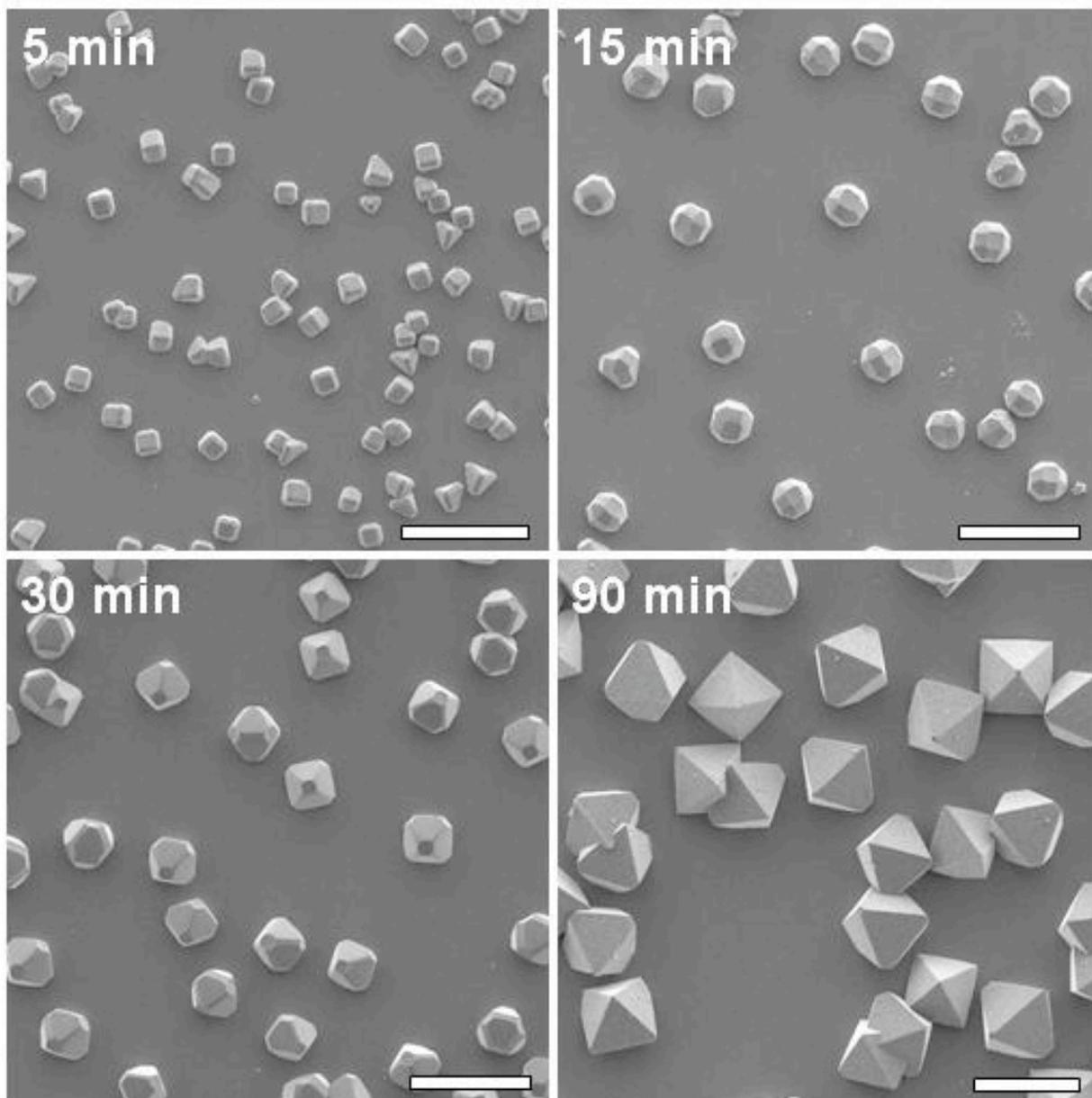
**Figure 1S:** A representative powder x-ray diffraction pattern of  $\text{Cu}_2\text{O}$  crystals deposited on ITO. This specific pattern was obtained from the crystals shown in Figure 4S with a deposition time of 90 min, but all other samples show identical patterns with intensities proportional to the quantity of  $\text{Cu}_2\text{O}$  deposited. Reflections generated by the ITO substrate are marked as \*.



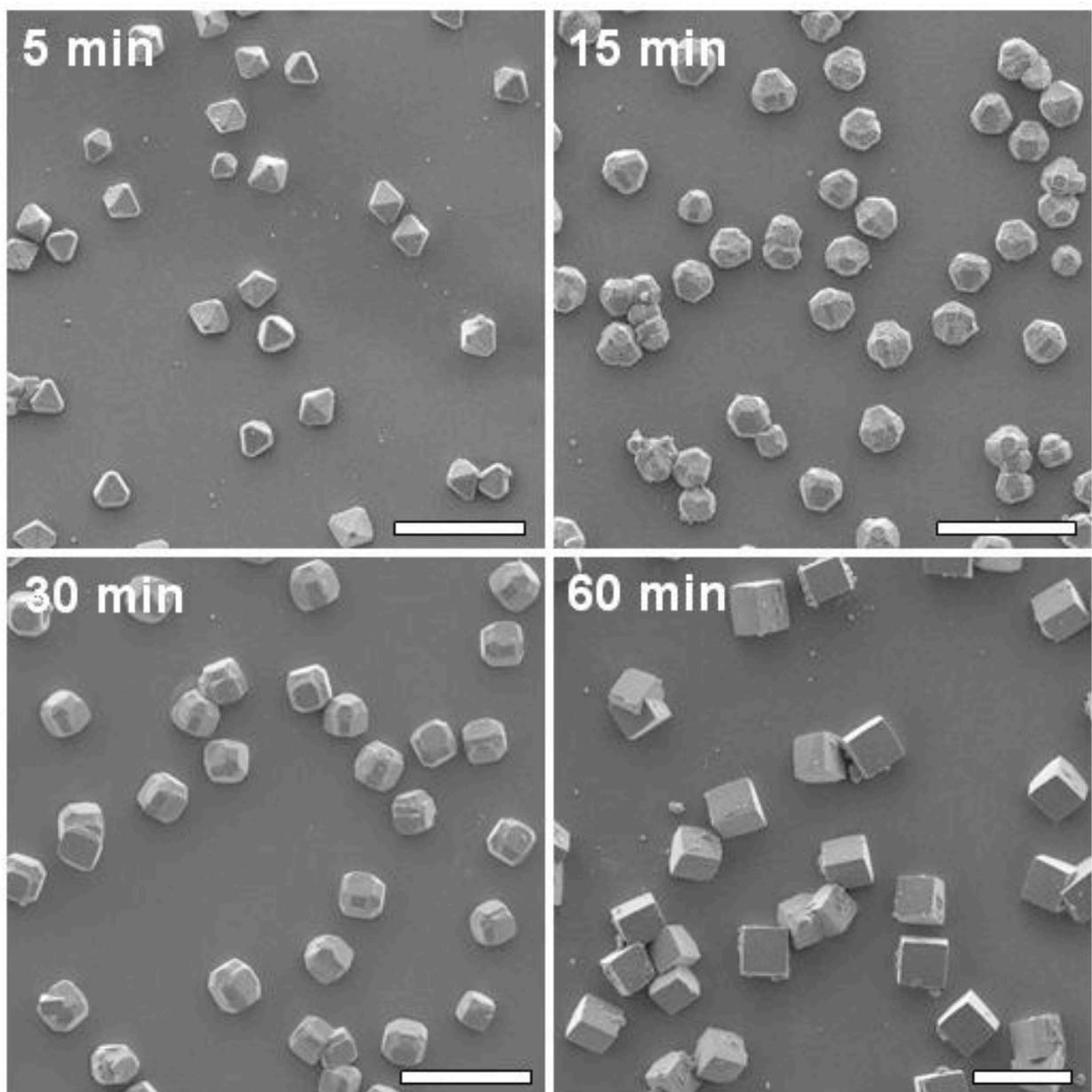
**Figure 2S:** SEM images of  $\text{Cu}_2\text{O}$  crystals deposited on ITO using the same conditions and solutions described in Figure 1 when  $\text{Cu}_2\text{O}$  cubes are not pre-grown and the additives are present from the beginning of the crystallization process. Crystals were cathodically deposited from 0.02 M  $\text{Cu}(\text{NO}_3)_2$  solutions containing 0.17 M  $\text{NaNO}_3$ ,  $\text{Na}_2\text{SO}_4$ ,  $\text{NH}_4\text{NO}_3$ , or  $(\text{NH}_4)_2\text{SO}_4$  using a current density of  $0.3 \text{ mA cm}^{-2}$  at  $60 \text{ }^\circ\text{C}$  for 10 minutes. For each case, crystals oriented with the  $\{100\}$  and  $\{111\}$  planes parallel to the substrate are shown on the left and right sides respectively (scale bar =  $1 \text{ } \mu\text{m}$ ).



**Figure 3S:** Representative SEM Images of pre-grown (a) cubic and (b) octahedral Cu<sub>2</sub>O crystals used in this study. These crystals are uniform in shape and size, but have random orientations due to the polycrystalline nature of the ITO substrates used as working electrodes (scale bar = 10  $\mu\text{m}$ ).



**Figure 4S:** Low magnification SEM images of crystals displayed in Figure 2 showing the uniformity of shape regulation obtained in this study. Images show the transformation of pre-grown cubic  $\text{Cu}_2\text{O}$  crystals over time in a 0.02 M  $\text{Cu}(\text{NO}_3)_2$  solution containing 0.17 M  $(\text{NH}_4)_2\text{SO}_4$  (scale bar = 10  $\mu\text{m}$ ).



**Figure 5S:** Low magnification SEM images of crystals displayed in Figure 3 showing the uniformity of shape regulation obtained in this study. Images show the transformation of pre-grown octahedral Cu<sub>2</sub>O crystals over time in a 0.02 M Cu(NO<sub>3</sub>)<sub>2</sub> solution containing 0.17 M sodium dodecyl sulfate and 0.004 M NaCl (scale bar = 10 μm).