Supplementary Information

Aligned CuO nanowire array for a high performance visible light photodetector

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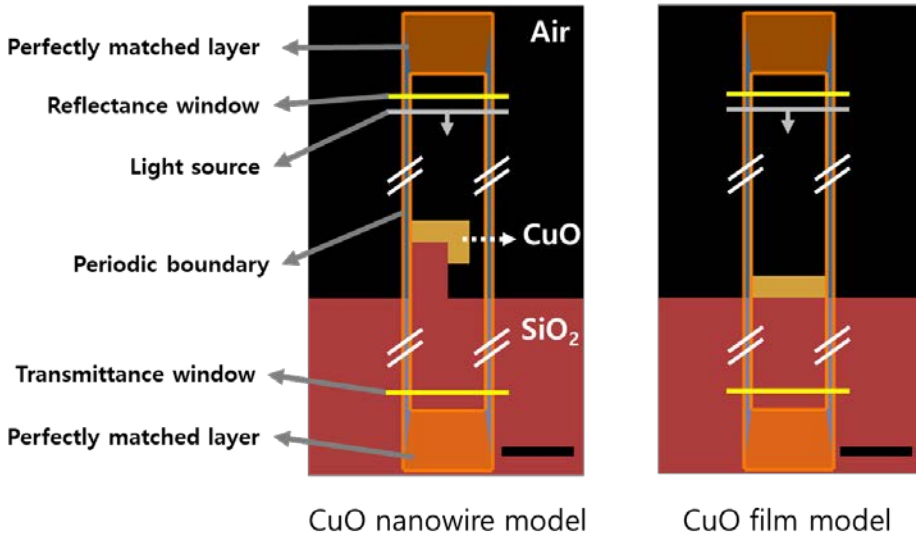

Figure S1. FDTD simulation design for CuO NW (left) and CuO film (scale bar : 400 nm) (Perfectly matched layer : an artificial perfectly absorbing layer for wave equations, Reflectance/Transmittance window : a window getting reflectance and transmittance by calculating the energy going through the window, Light source : the normal incident light with 400~700 nm wavelength, Period boundary : a boundary of FDTD region for calculating a periodic structure.

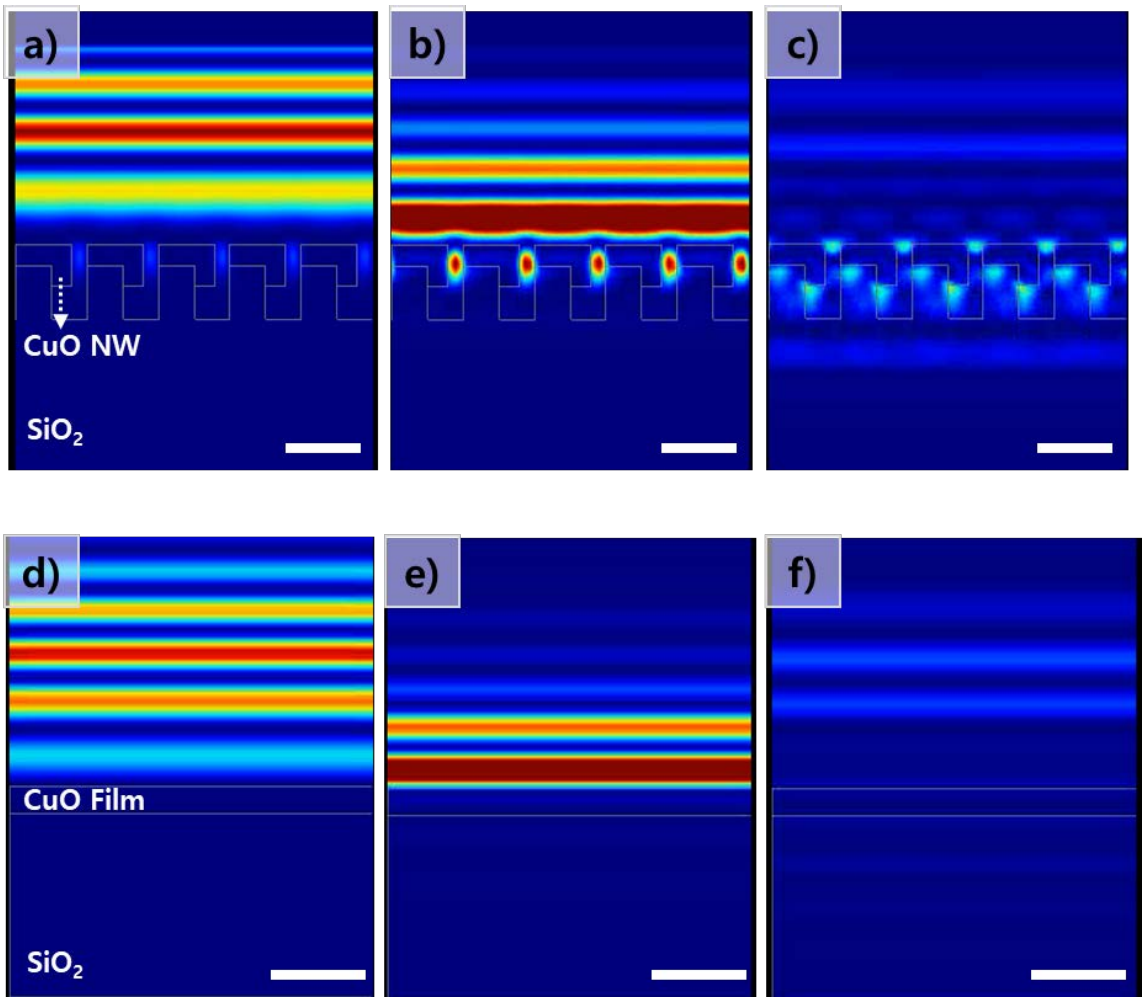

Figure S2. E-field monitoring on the CuO NW and CuO film in time order. a,d) before the incident light reaches to the CuO, b,e) when the incident light reaches to the CuO, c,f) after the incident light reaches to the CuO (scale bar : 500 nm / The wavelength of light source is 400~700 nm).

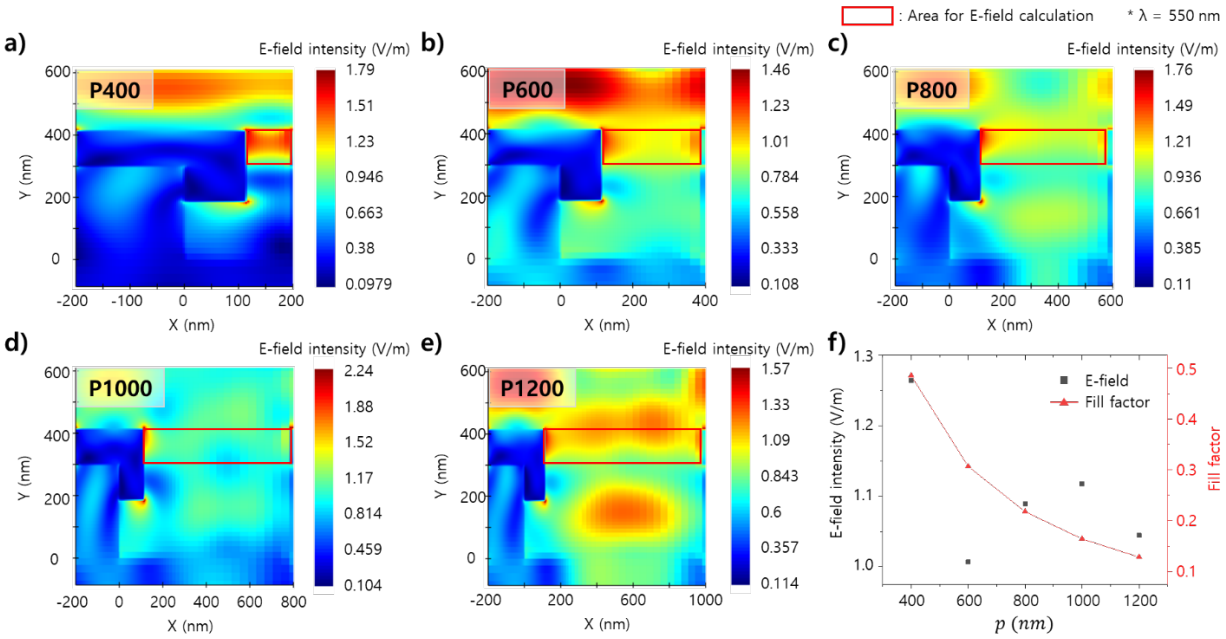

Figure S3. a-e) E-field intensity of the CuO NW with various pitches (*p*) at 550 nm wavelength of the incident light, f) Average E-filed intensity in the red box between the CuO NWs and the fill factor of CuO in the CuO layer with various pitches.

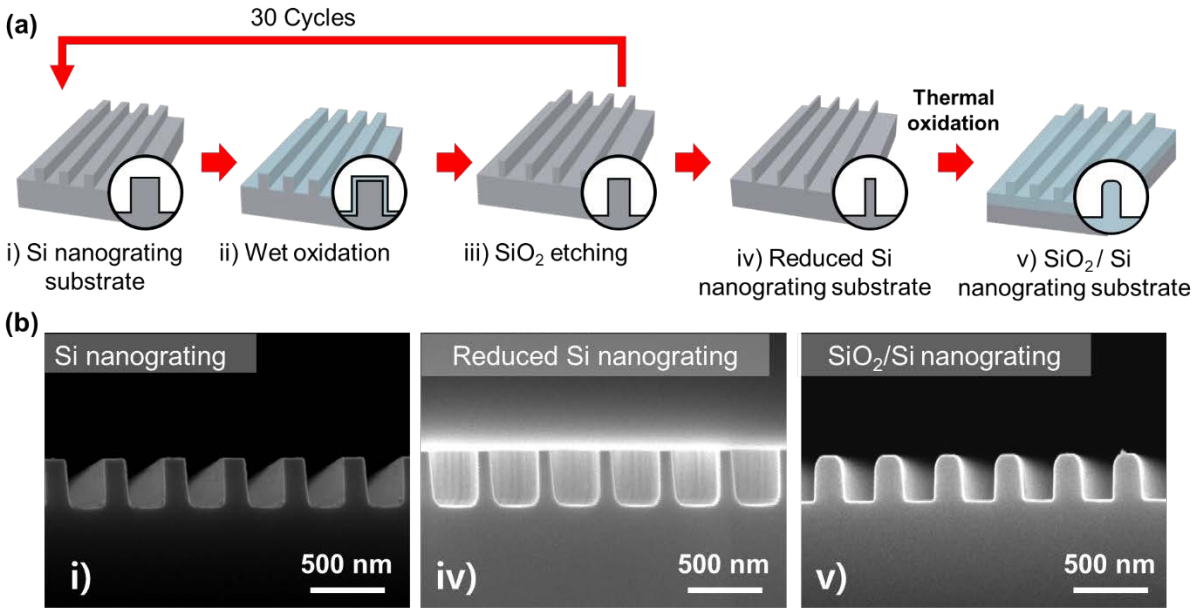

Figure S4. a) The fabrication process of SiO_2 nanograting substrate b) The cross-sectional SEM image of Si nanograting (left; a-i), size reduced Si nanograting (center; a-iv) and oxidized nanograting (right; a-v).

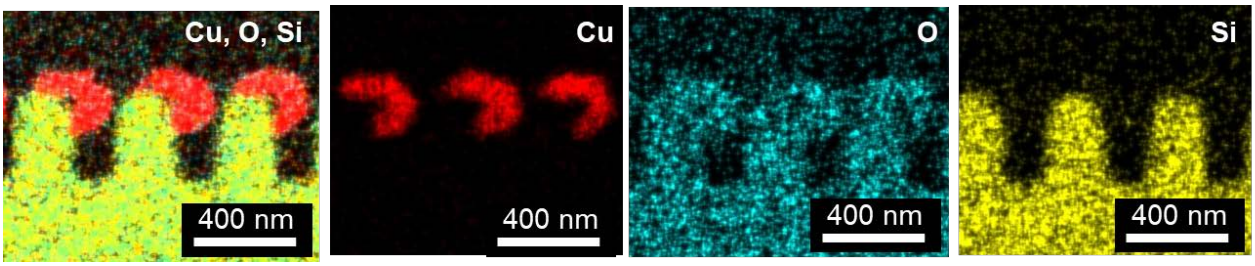

Figure S5. EDS results of the CuO NW on the SiO_2 nanograting.

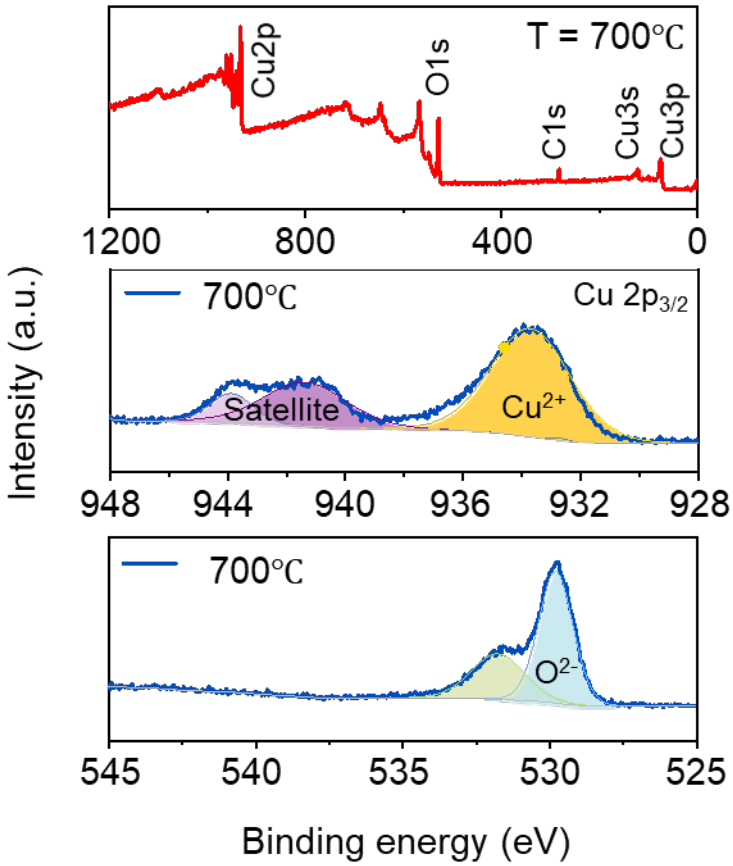

Figure S6. XPS results of the CuO annealed at 700°C.

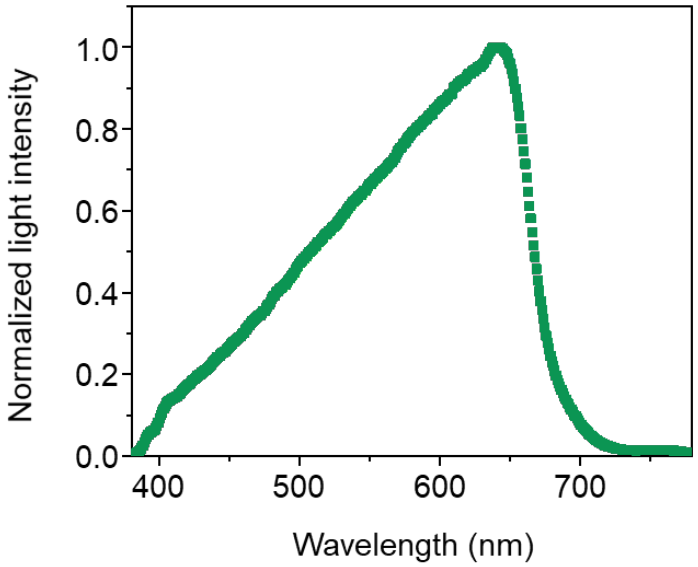

Figure S7. Normalized light intensity of the halogen lamp between 380 nm and 780 nm

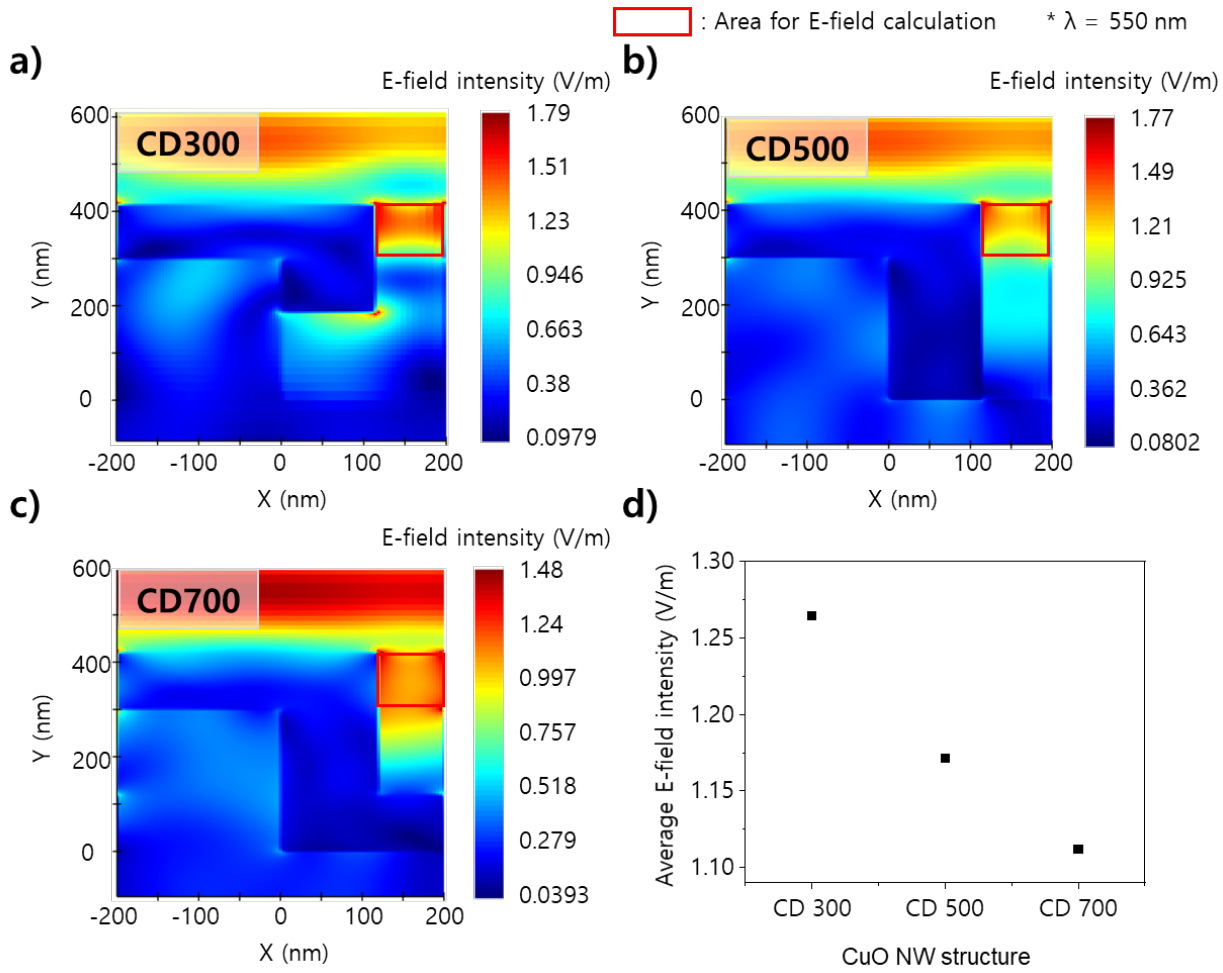

Figure S8. a-c) E-field intensity of the CuO NW with various critical dimensions(*CD*) at 550 nm wavelength of the incident light, d) Average E-filed intensity in the red box between the CuO NW with various *CD*s

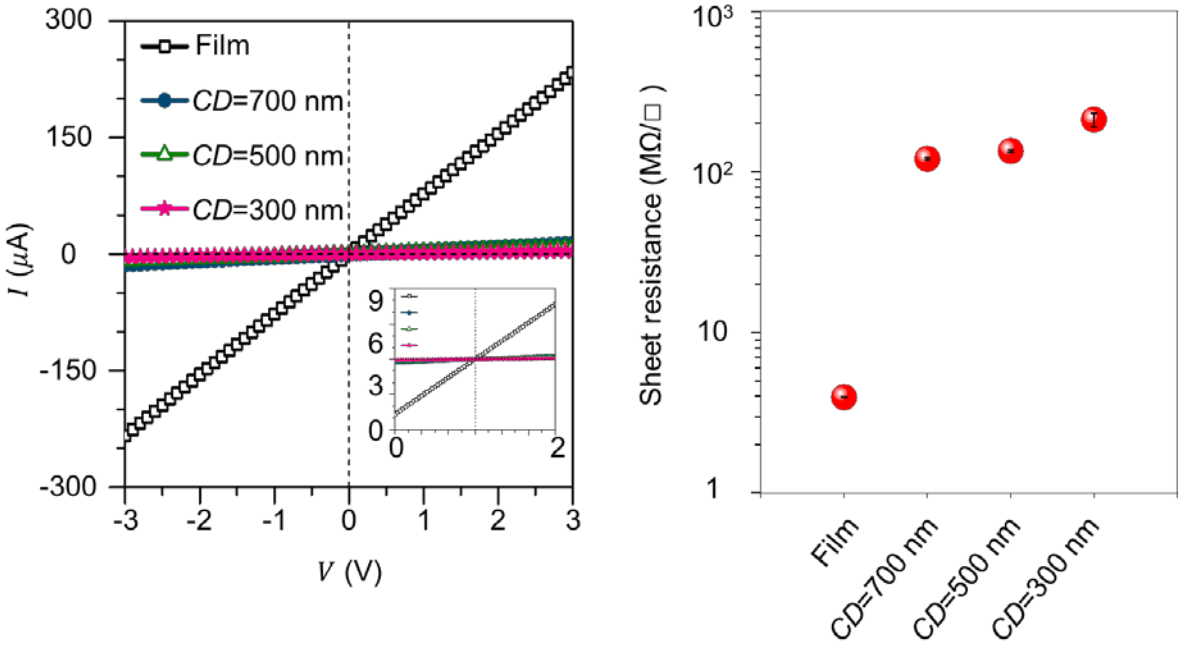

Figure S9. The measured *I-V* curves and sheet resistance of the CuO devices

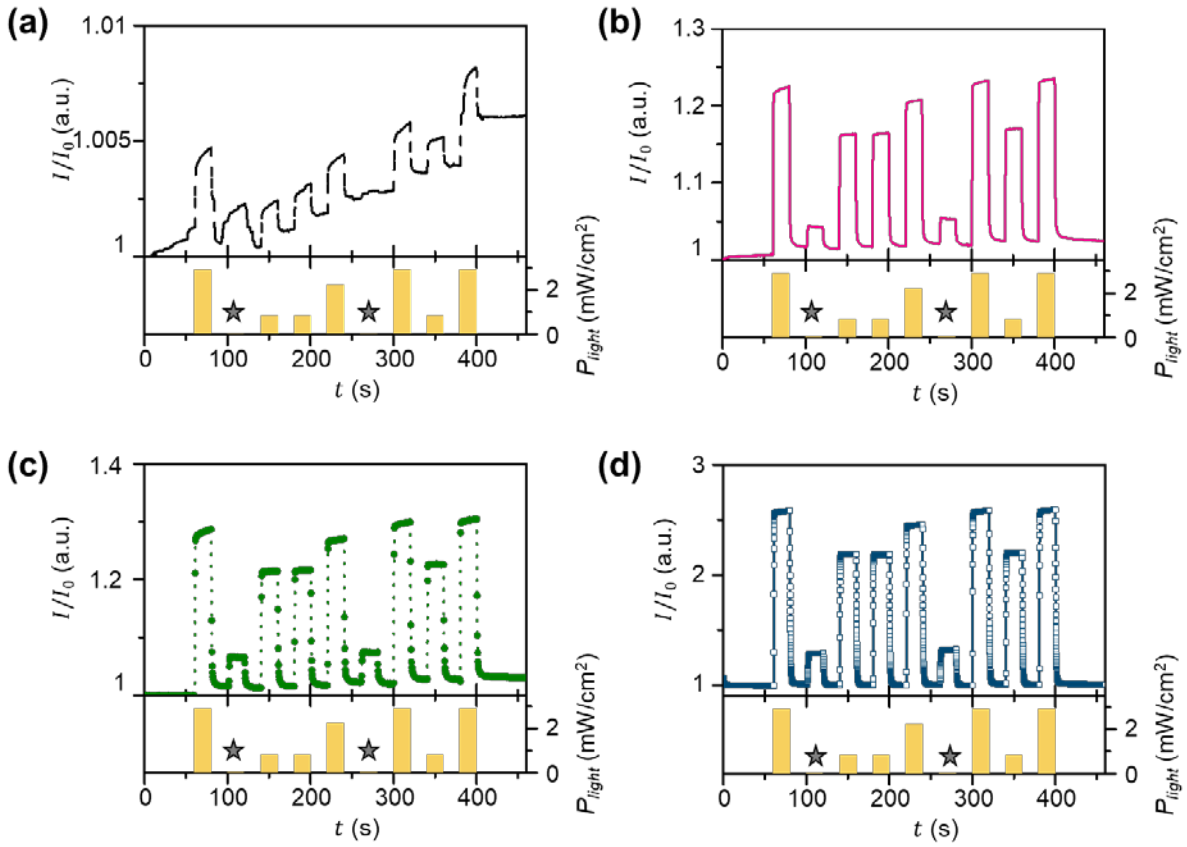

Figure S10. The optoelectronic responses of the CuO devices. a) the CuO film, b) the CuO NW with *CD*=700 nm, c) *CD*=500 nm, d) *CD*=300 nm

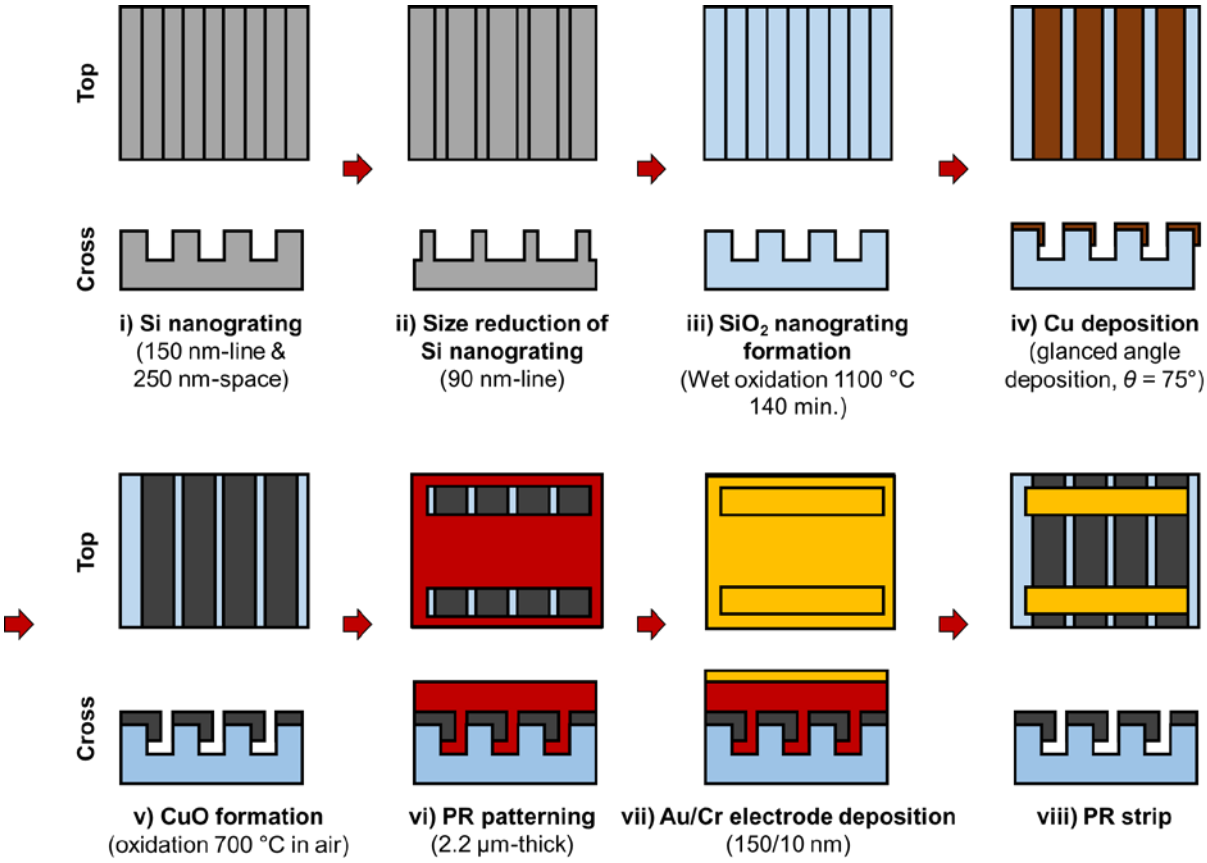

Figure S11. Detailed experimental conditions of CuO photodetectors fabrication process