

## Supplementary Information

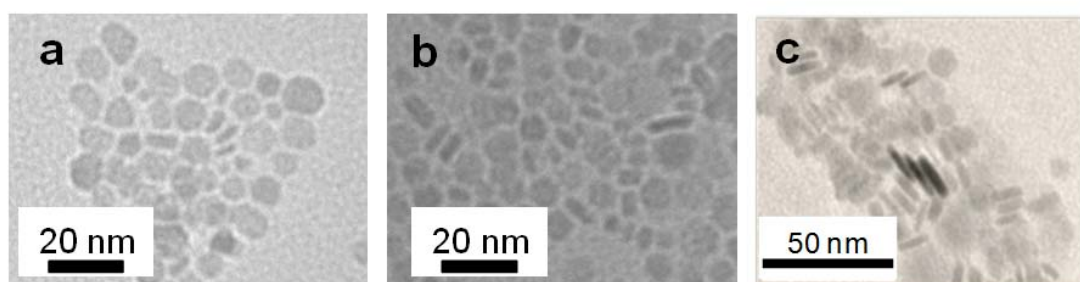
# Electrochemical redox-based tuning of near infrared localized plasmons of CuS nanoplates

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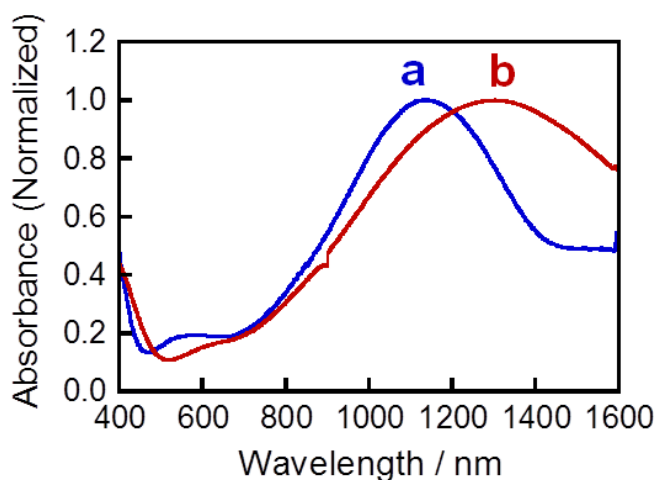
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### Additional information

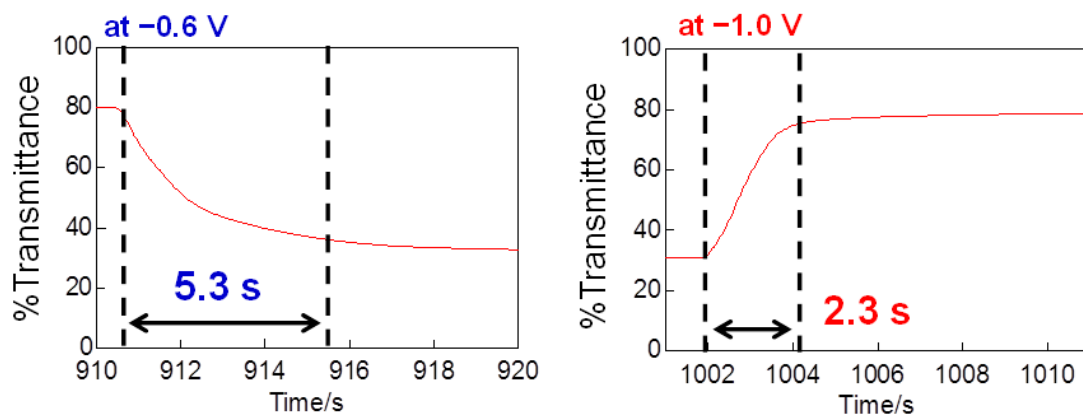
The peak wavelength and width were virtually the same after electrochemical tuning, suggesting no severe degradation of nanoplates. In addition, essentially the same behaviour was observed when nanoplates with longer absorption peak wavelength was used, except for the operational wavelength range.



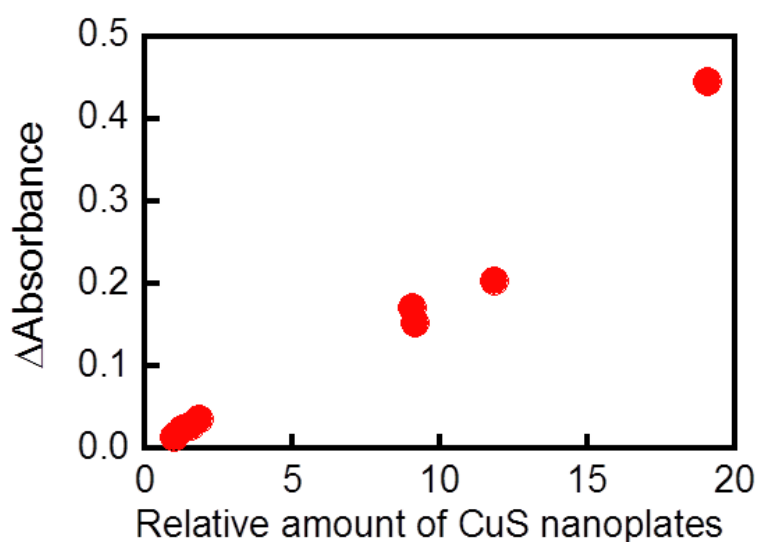
**Fig. S1** TEM images of CuS nanoplates with the average width of (a) 7.6, (b) 8.9 and (c) 12.7 nm.



**Fig. S2** Absorbance spectra in air of CuS nanoplates (average width = 7.6 nm) deposited on ITO. (a) The sample for Fig. 3 and (b) that for Fig. 4a. As the amount of CuS is increased, the peak is redshifted and broadened because of aggregation of the nanoplates.



**Fig. S3** Detailed transmittance changes of CuS nanoplates (data from Fig. 4b). The faster reaction of the reduction process is due to the larger overvoltage applied (0.25 V) than that of the oxidation (0.15 V) (note that the formal potential is ca.0.75 V). When applying an overvoltage larger than 0.15 V, oxidation of  $S^{2-}$  in the electrolyte cannot be negligible.



**Fig. S4** Relationship between the relative amount of CuS nanoplates on ITO (determined on the basis of the absorbance at the plasmon peak wavelength in air) and  $\Delta$ absorbance along with the electrochromic reaction of the electrode. The linear relationship suggests good electronic and ionic conductivity of the CuS nanoplate layer.