

Supplementary Information

Self-Assembly of Noble Metal-Free Graphene- Copper Plasmonic Metasurfaces

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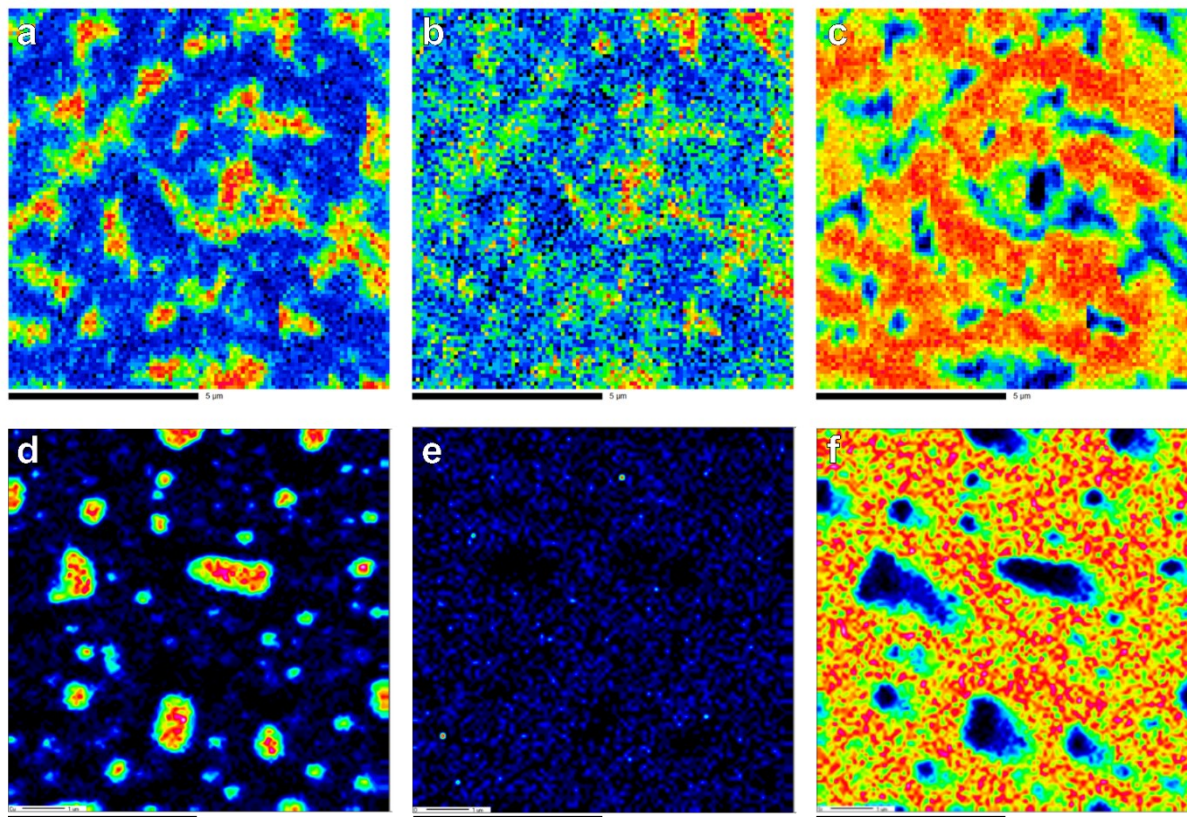


Figure S1. WDS mappings of a 2.7 μ m thickness sample before (top row) and after (bottom row) graphene growth. Panels a) and d): Cu-L α signal; b) and e): O-K α signal; c) and f): Si signal. Scalebar: 5 μ m

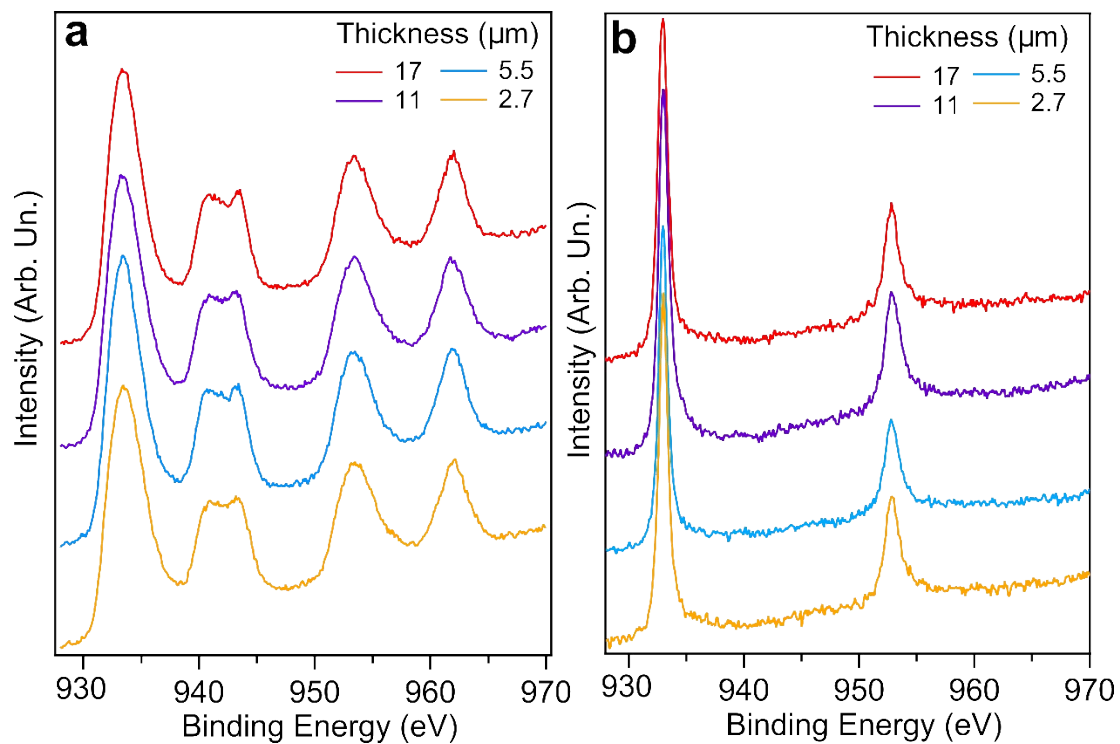


Figure S2: Photoemission spectra from Cu2p core level for all samples reported in the main text. (a) Spectra from the CuO films, as grown, on Si substrate. (b) Spectra for all samples after conversion and graphene growth. Samples grown on quartz for sensing measurements.

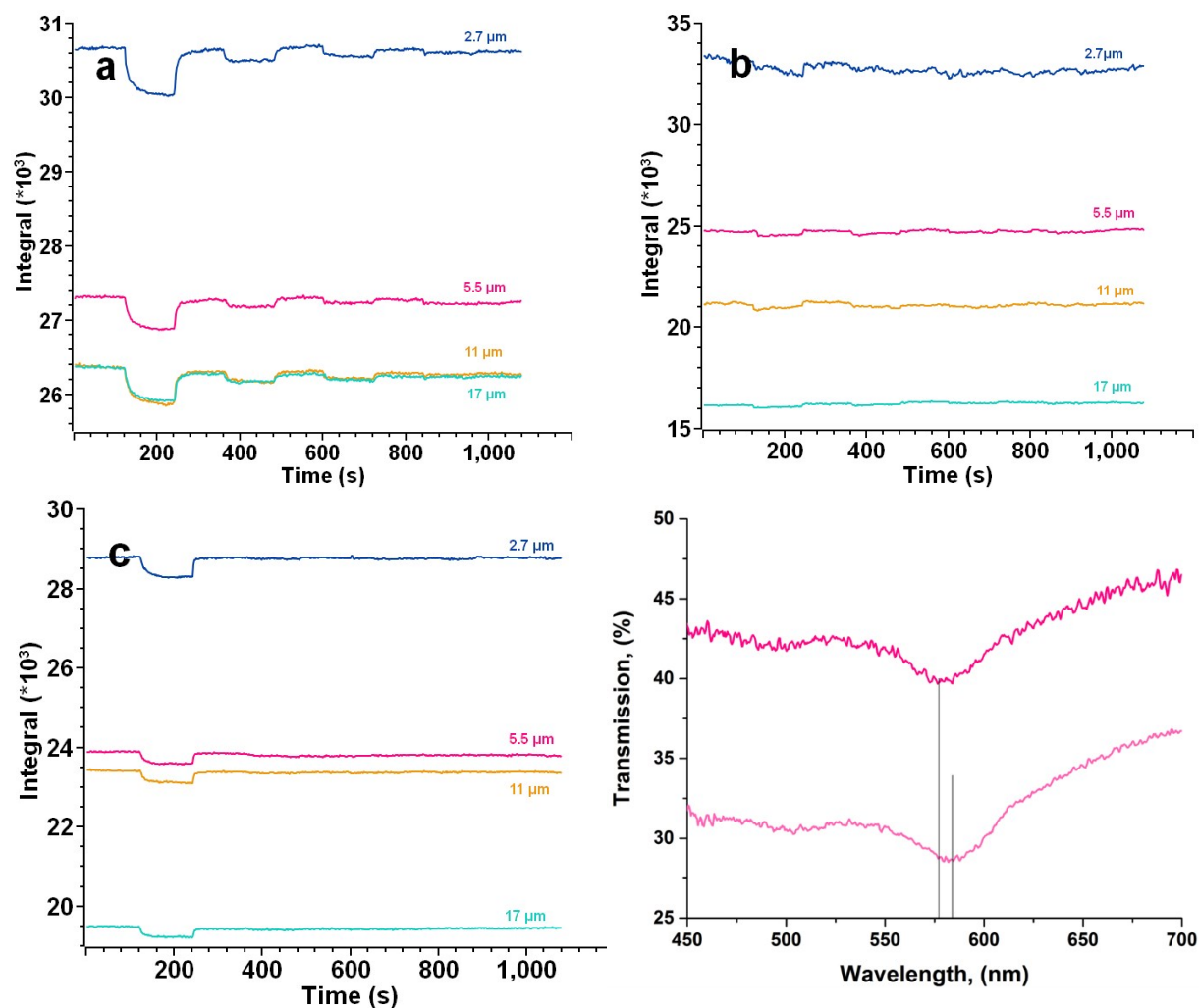


Figure S3: Plasmonic response for all samples for different volatile compounds, obtained via the integral method.¹ (a) decreasing concentration of toluene; (b) ethanol; (c) acetone. (d) Transmittance of the 5.5 μm thickness sample before and after 90 days of air exposure.

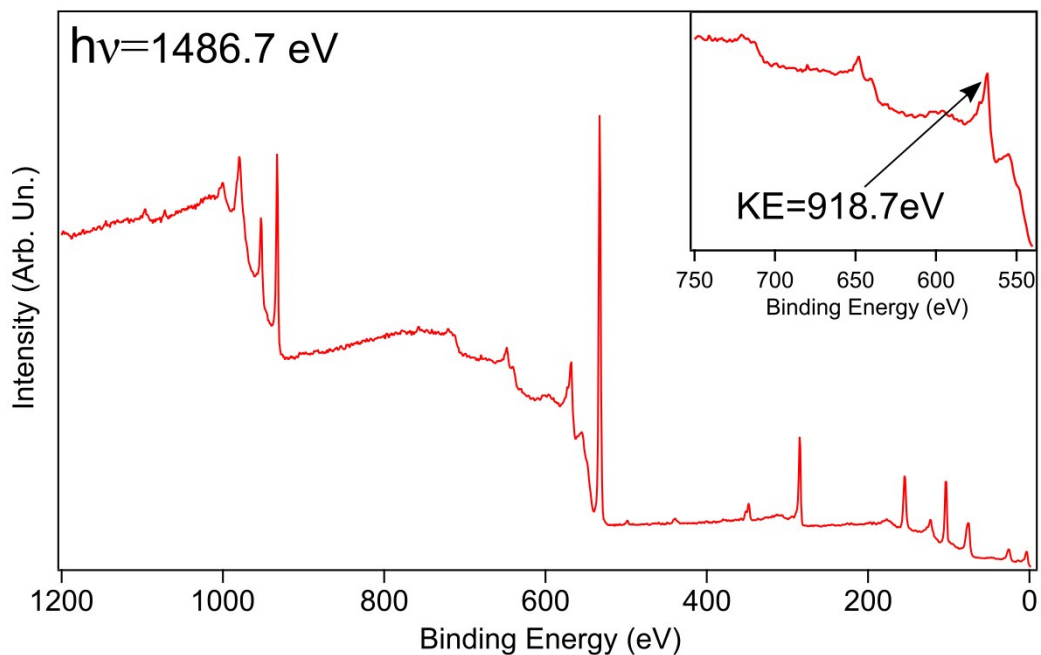


Figure S4: Survey x-ray photoelectron spectroscopy data of the graphene-coated Cu nanoparticles, for the sample with initial thickness 2.7 μm , acquired at a photon energy $h\nu=1486.7$ eV. Inset: Close-up on the Cu LMM Auger edge.

Initial CuO thickness	LSPR minimum
2.7	573.4
5.5	568.8
11	574.2
17	570.4

Table S1: Position of the LSPR minimum as a function of initial CuO thickness for all samples. The curves were fitted with a Gaussian lineshape, on a wavelength span of ± 12.5 nm around the estimated position of the minimum.

References

1. M.G. Manera, J. Spadavecchia, D. Buso, C. de Julian Fernandez, G. Mattei, A. Martucci, P. Mulvaney, J. Perez-Juste, R. Rella, L. Vasanelli, P. Mazzoldi, *Sens. Actuators B*, **2008**, *132*, 107; b) B. Zeng, Y. Gao, F. J. Bartoli, *Appl. Phys. Lett*, **2014**, *105*, 161106.