

Supporting Information

Inkjet-printed multi-wavelength thermo-plasmonic images for anti-counterfeiting applications

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Here, we provide supporting information including four figures and two movie clips that help understanding of the provided work in the manuscript. The two movies of thermal images of the printed samples in this work are available online. Descriptions of the clips are below.

Supporting video captions

Movie S1 | Large-area thermo-plasmonic image heat generation movie for the encrypted inkjet-printed thermo-plasmonic image sample in Figure 4(b), (c) and (e, top). Temperature change (ΔT) from baseline temperature was extracted from raw recording of thermal image movie. A screen shot is shown in Figure 4d.

Movie S2 | Large-area thermo-plasmonic image heat generation movie for the color laser printed similar pattern image sample in Figure 4(e, bottom). Temperature change (ΔT) from baseline temperature was extracted from raw recording of thermal image movie. A screen shot is shown in Figure 4(f).

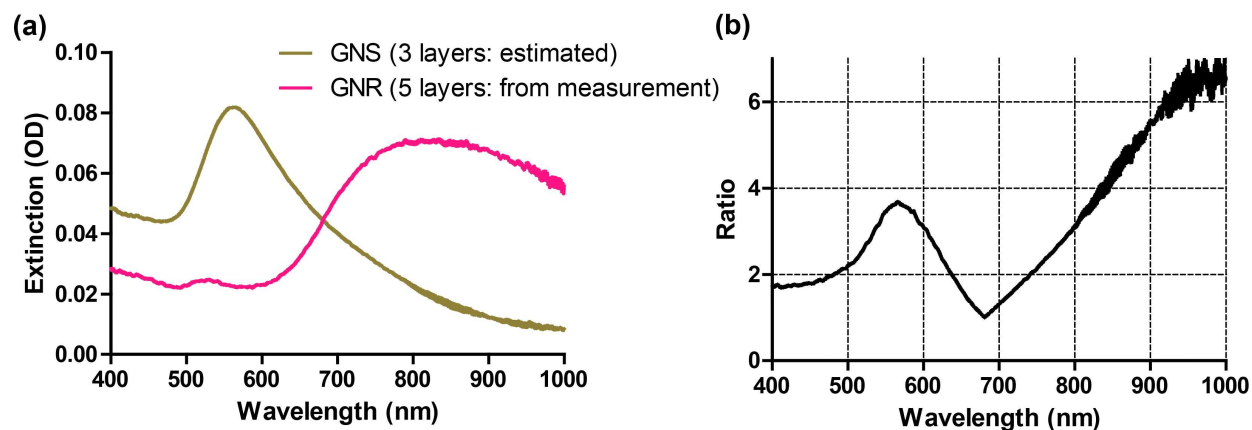


Figure S1. (a) Expected extinction spectra of the printed thermo-plasmonic images of two different nanoparticles on flexible FEP membrane with optimized printing concentration GNR: 5 layers, $0.79 \text{ OD} \cdot \text{pL}/\mu\text{m}^2$; GNS; 3 layers, $0.57 \text{ OD} \cdot \text{pL}/\mu\text{m}^2$). (b) Anticipated extinction ratio of the two samples in (a), showing more balanced ratio between NIR and green light wavelength range.

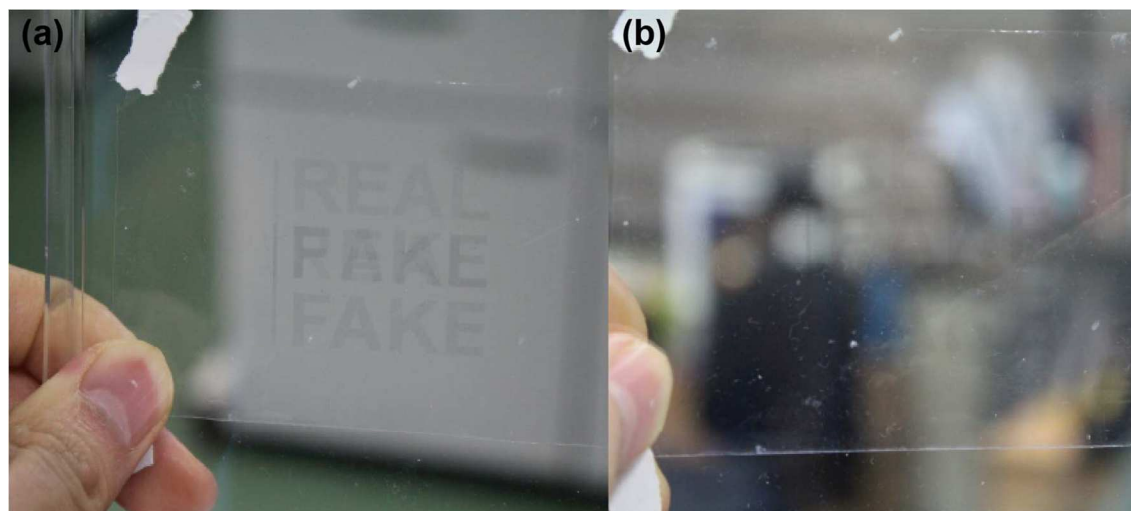


Figure S2. Pictures of the inkjet-printed multi-wavelength thermo-plasmonic images taken with various backgrounds. Nanoparticles were printed based on the optimized conditions in Figure S1.

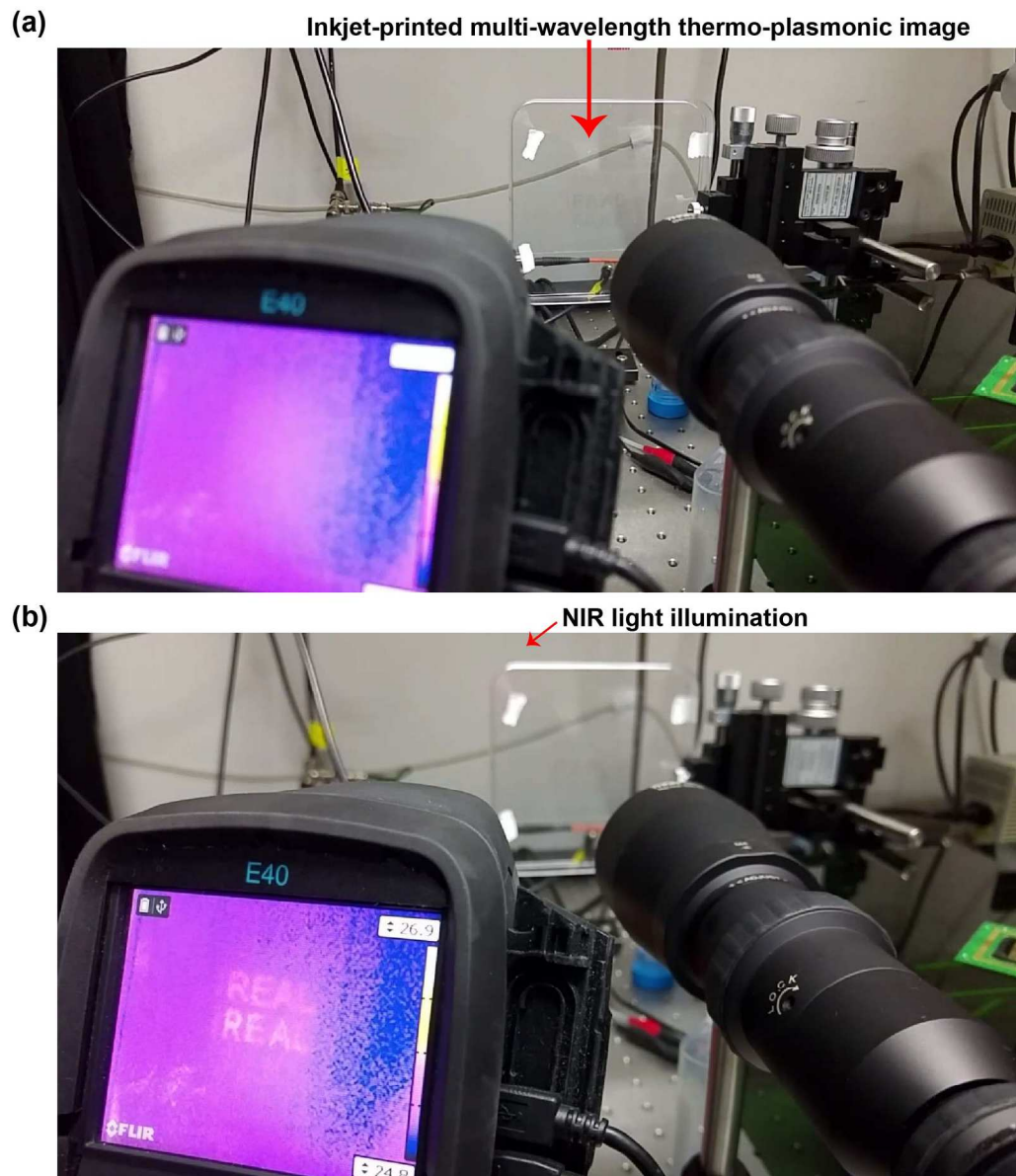


Figure S3. Photothermal imaging test setup of the multi-wavelength thermo-plasmonic printing image. (a) When the NIR light is off. (b) When the NIR light is turned on. Slightly red color area (see the arrow above) is the transmitted NIR light through the printing sample. Thermal imaging camera clearly observe the photothermal patterns.

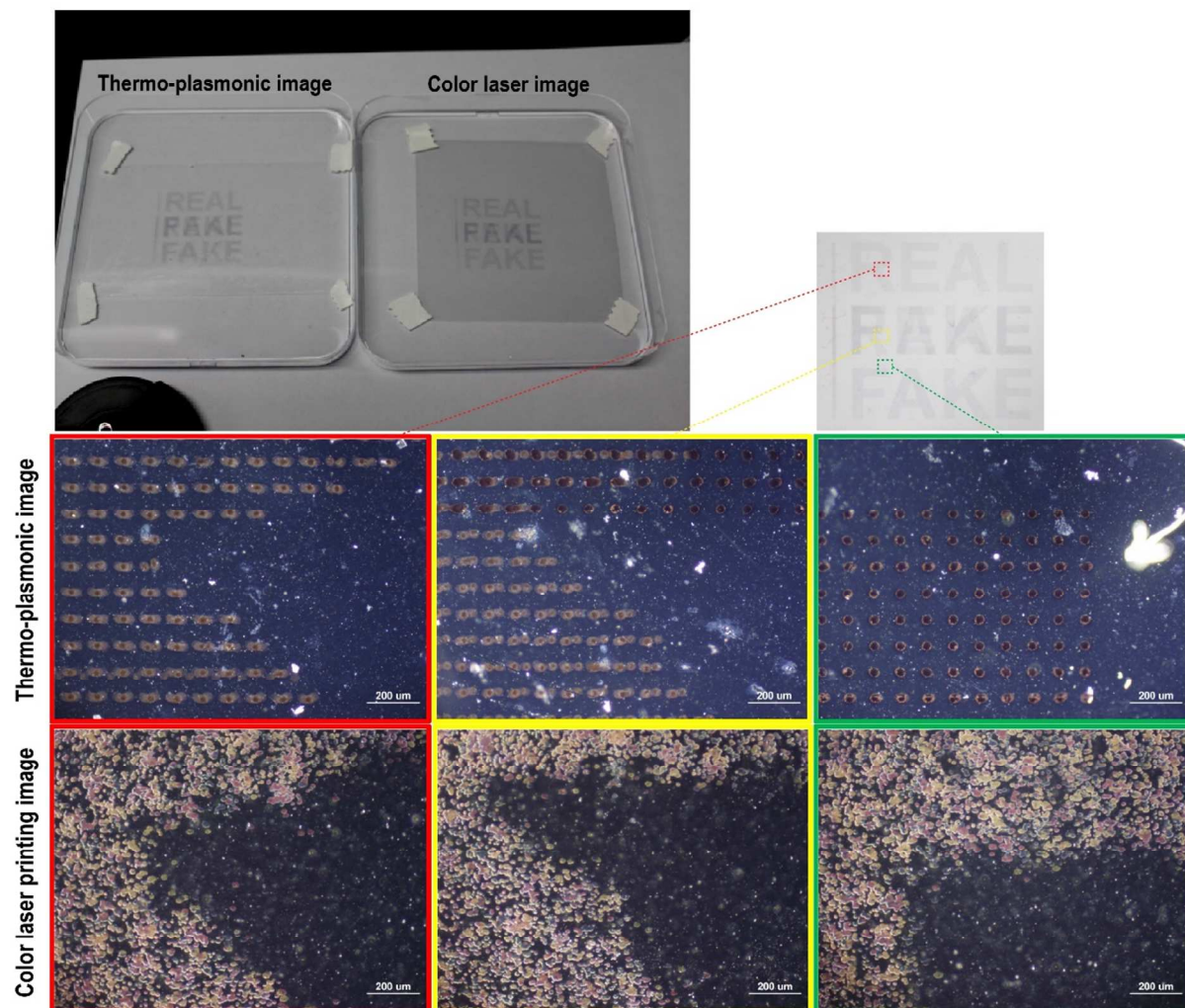


Figure S4. Comparison between inkjet-printed multi-wavelength thermo-plasmonic image (left in a digital camera photo; top in dark-field microscopic images) and a conventional color laser printing image on overhead projector film (right, bottom). Dark-field microscopic images of identical or similar areas of the two images are provided for comparison. See poorer printing resolution of the color laser printing.