

## Electronic Supplementary Information (ESI)

# Dipole-multipole Plasmonic Coupling between Gold Nanorods and Titanium Nitride Nanoparticles for Enhanced Photothermal Conversion

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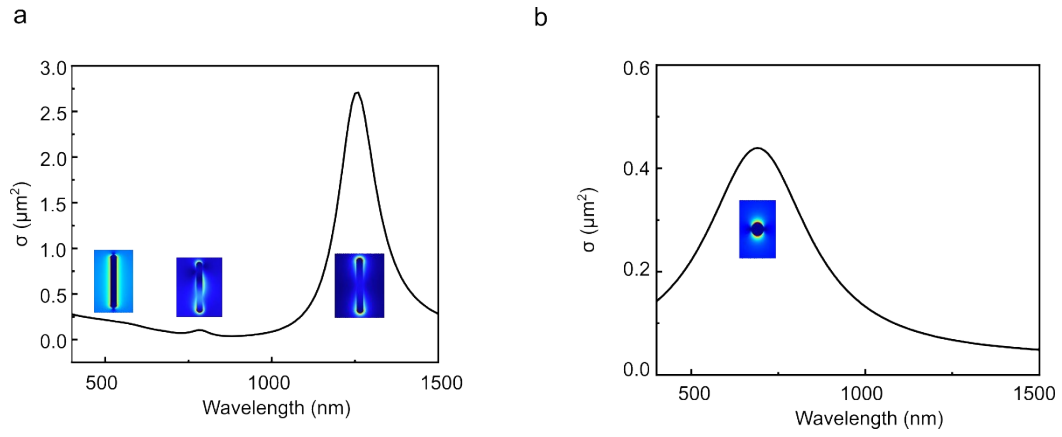
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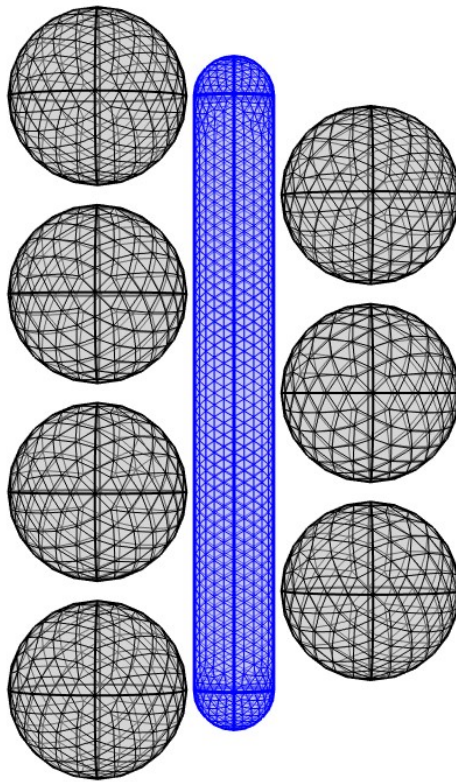
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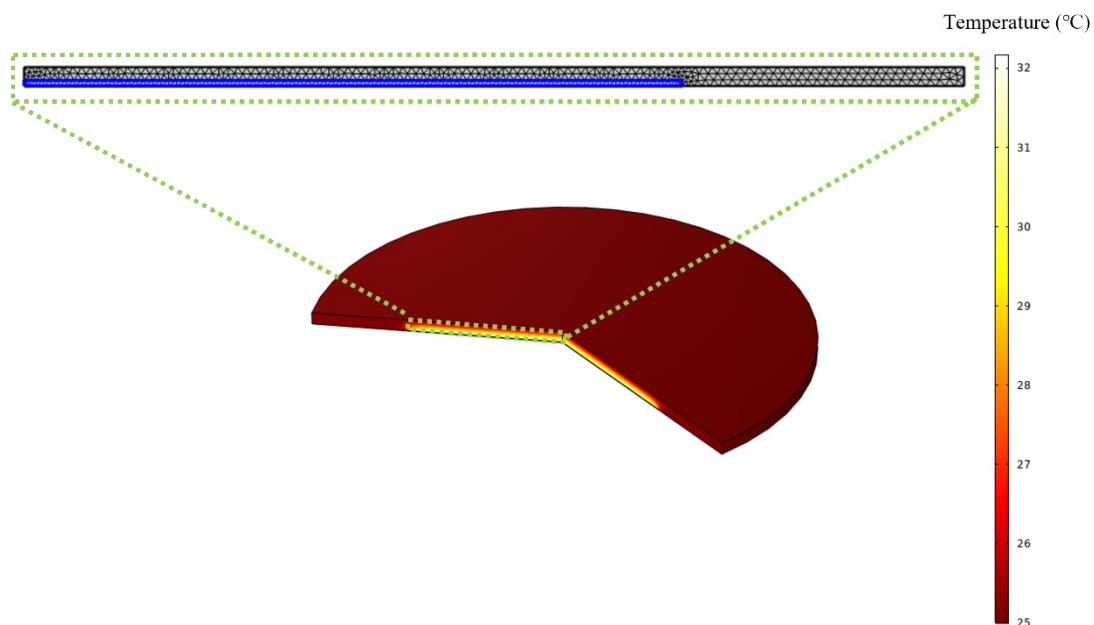
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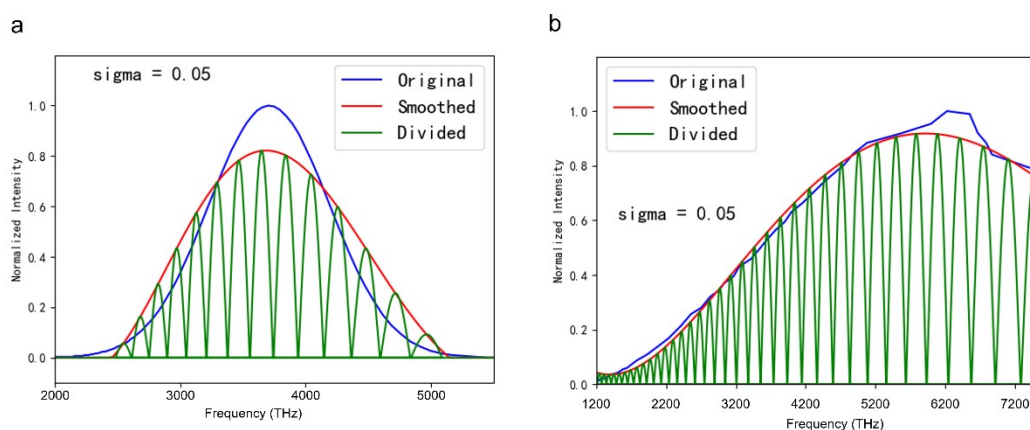
**Fig. S1** Calculated far-field spectrum of Au NR **(a)** and TiN NP **(b)**, and inset showed normalized E-field distribution at each mode.



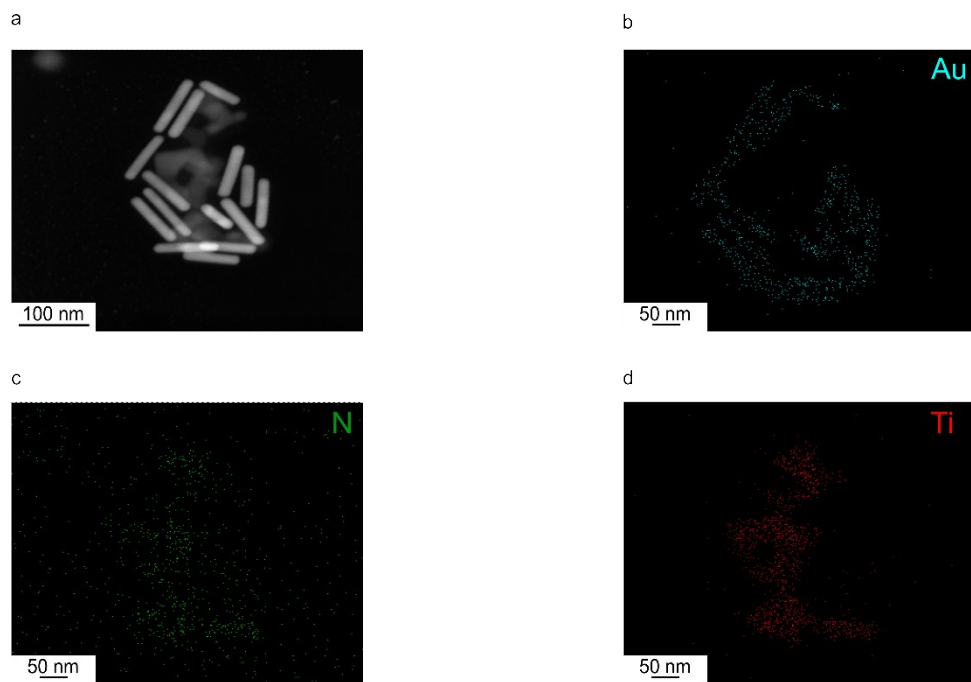
**Fig. S2** Representative mesh plot of Au NR/TiN NP nanocluster.



**Fig. S3** Modeling of Au NR/TiN NP/PVDF nanofilm.



**Fig. S4** Processed elemental Gaussian beam series with different beam diameter to approximately describe 808 nm monochromatic laser beam **(a)** and solar spectrum **(b)**, respectively. Blue curve indicates the normalized 808 nm monochromatic laser beam and original solar spectrum, red curve indicates the polynomial smoothed curve, and the green curve indicates the processed elemental Gaussian beam series with  $\sigma = 0.05$ .



**Fig. S5 (a)** Representative TEM image of Au NR/TiN NP nanocluster; **(b) – (d)** Elemental mapping of Au NR/TiN NP nanocluster in **Fig. S5a**.