

Supporting Information

Self-assembled metamaterial perfect absorbers at visible wavelengths using core-shell Au@SiO₂ meta-atoms

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S1. Synthesis of Au NP colloids

Au NP colloids with grain size of ~45 nm were synthesized as follows: 30 mL of 1,5-pentanediol (PD) solution was firstly boiled and refluxed at 230 °C under constant stirring in an oil bath. After 10 min, 0.2 mL of 15 mM AgNO₃ in PD was quickly added, next, a mixture of PVP (6 mL, 150 mM) and HAuCl₄ (3 mL, 50 mM) in PD was introduced at an uniform speed within 9 min. The resulting mixture was continuously heated at reflux for 1h, whereafter it was cooled to room temperature. The wine-red Au NP products were purified and collected by centrifugation (15000 rpm, 30 min) and washed repeatedly with water and ethanol in turn. The final Au NP colloids (with concentration of 0.8 g/L) were obtained through resuspending the as-prepared Au NP samples into an appropriate amount of water solution.

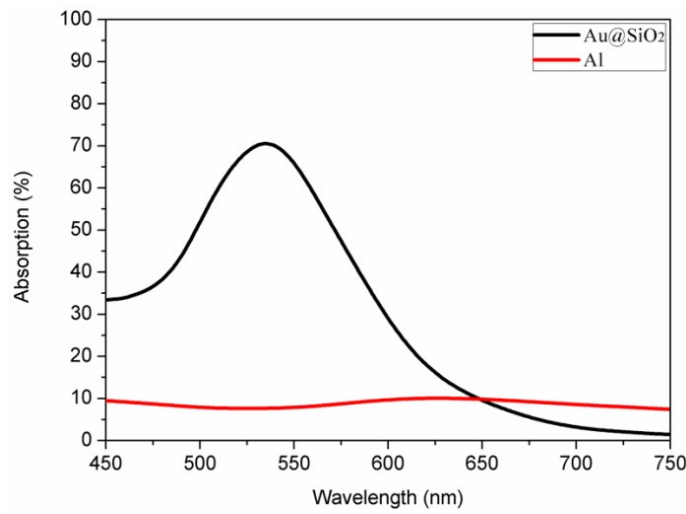


Fig.S1 Absorption spectra of the self-assembled 4-layer of Au@SiO₂ meta-atoms (black solid line) and the individual sputtering-deposited Al film (red solid line) on the Si substrates.

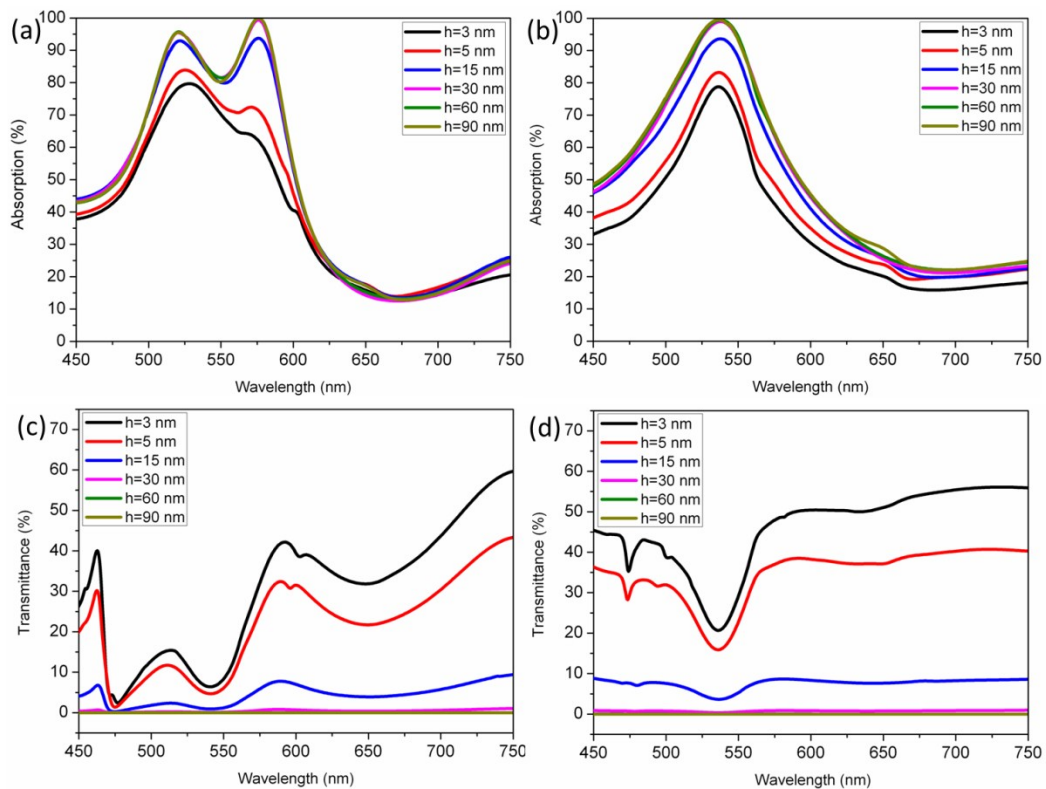


Fig. S2 The measured absorption (a, b) and transmission spectra (c, d) of the self-assembled MAs with different thicknesses of Al nanofilm. TE- (a, c) and TM- (b, d) polarized incidence are considered. The incident angles are both 45°.

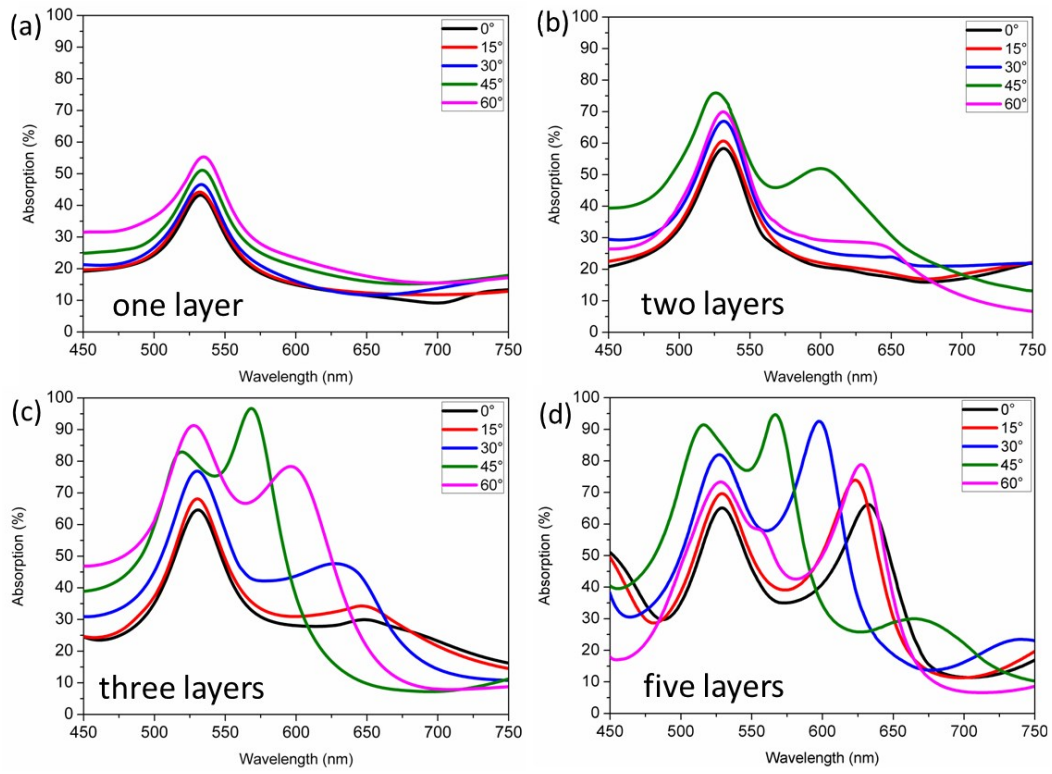


Fig. S3 TE-polarized light absorption spectra of the self-assembled MAs with different layers of Au@SiO₂ meta-atoms.