Supporting information

Metasurfaces as energy valves for sustainable energy management

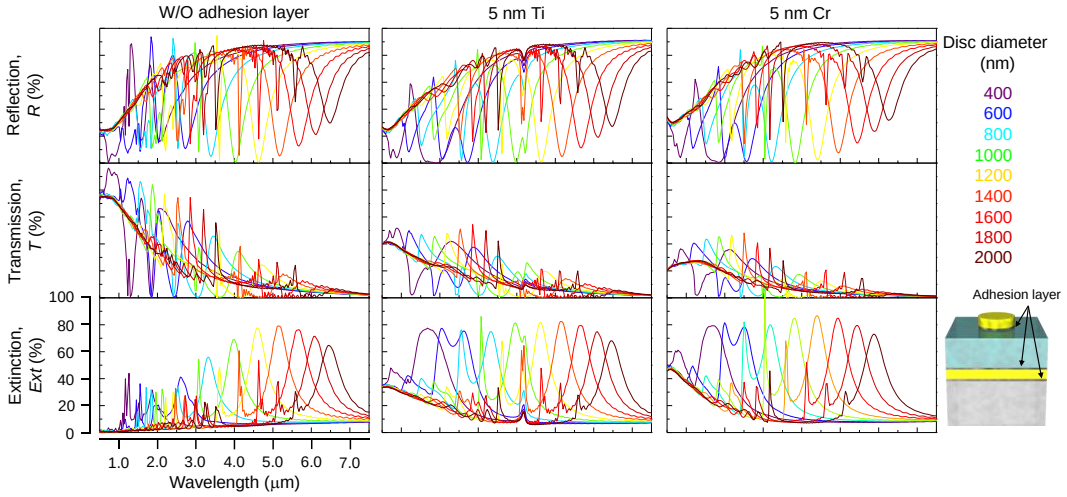

Figure S1 Influence of an adhesion nano-layer. FDTD simulations for thin-Au MIM metasurfaces without adhesion layer, with 5 nm Ti and 5 nm Cr as adhesion layers. Calculations are made for the MIM structure only without substrate.

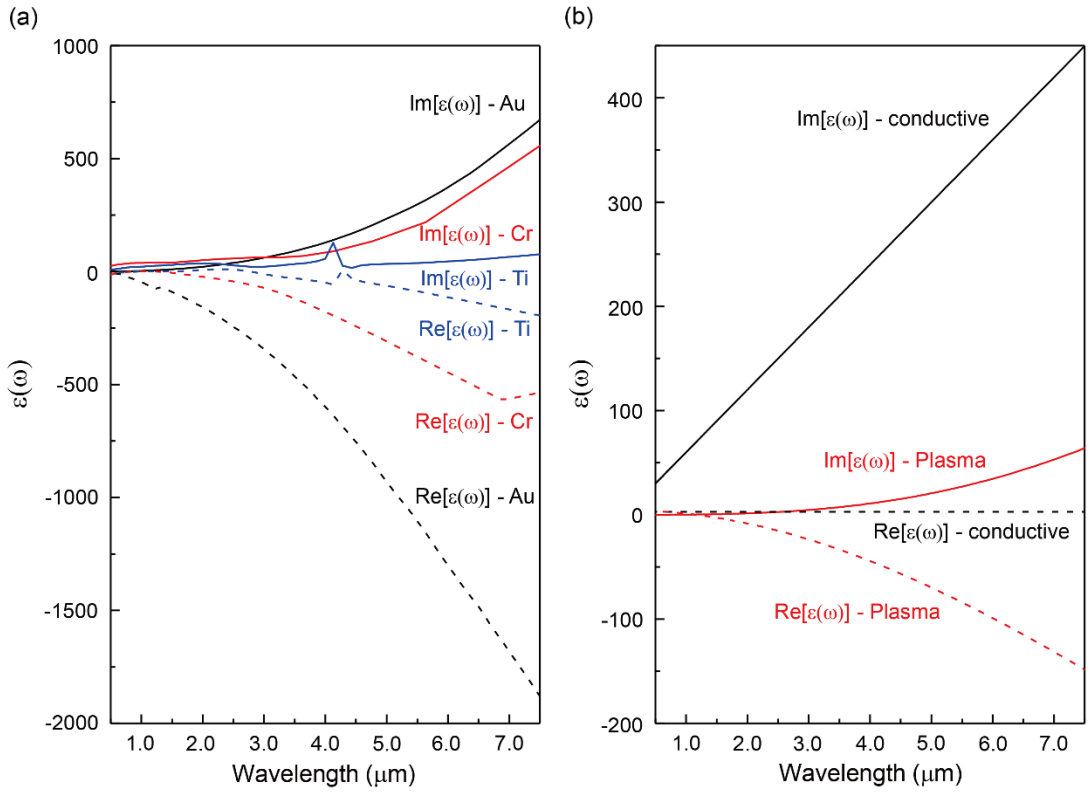

Figure S2 Optical permittivity of materials used in FDTD simulations: (a) Au, Cr, Ti obtained from Palik's database references. (b) Basic function implemented in the FDTD software for the 3D conductive and plasma (Drude) models with parameters of $\varepsilon_{DC} = 2.94$, $\sigma = 1.0 \times 10^6$ $(\Omega cm)^{-1}$, $\varepsilon_\infty = 4.4$, $\omega_P = 3.36 \times 10^{15}$ rad/s, $\Gamma = 1.05 \times 10^{14}$ 1/s.

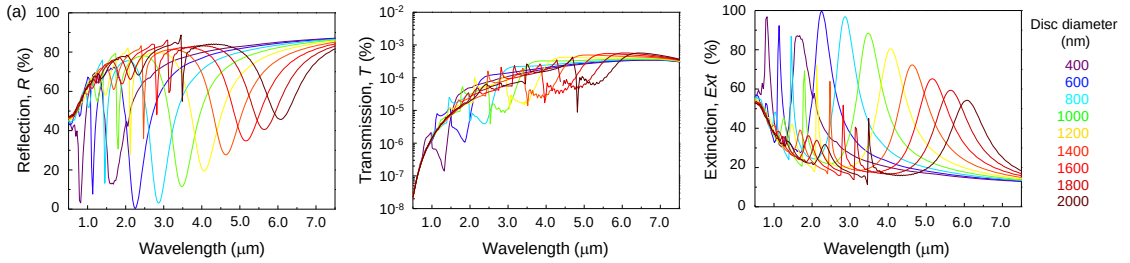

Figure S3 Reflectance R, Transmittance T and Extinction $Ext = 1-(R+T)$ spectra. FDTD simulations for ITO metasurfaces with 3D conductive model with $\varepsilon_{DC} = 2.94$, $\sigma = 1.0\times10^{6}$ $(\Omega cm)^{-1}$.

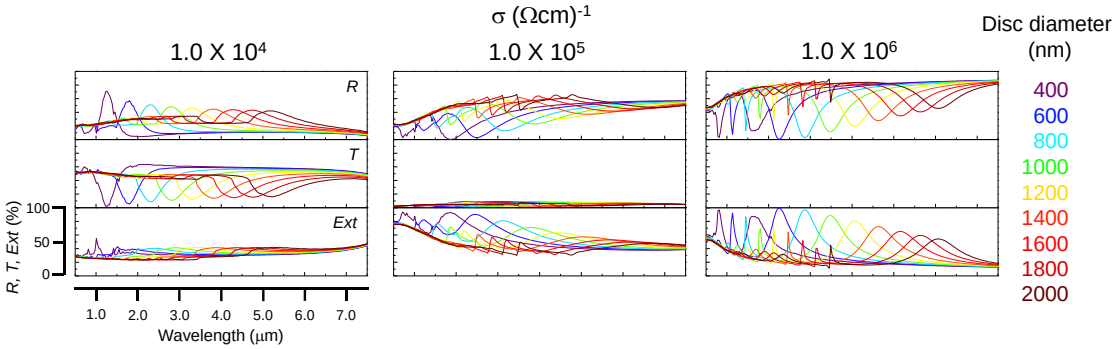

Figure S4 FDTD simulations for the 3D conductive model with $\varepsilon_{DC} = 2.94$ and σ is from 1.0×10^{4} to 1.0×10^{6} $(\Omega cm)^{-1}$.

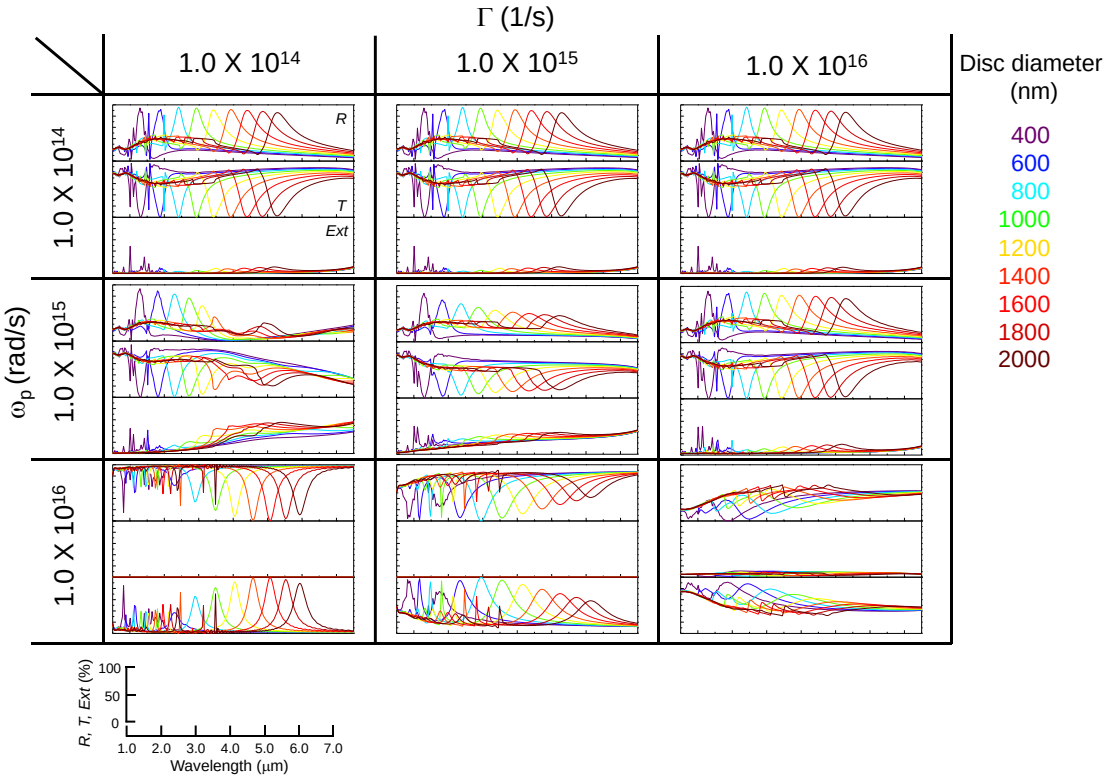

Figure S5 A series of FDTD simulations for the plasma model with $\varepsilon_{\infty}= 4.4$, ω_p was changing from 1.0×10^{14} to 1.0×10^{16} rad/s, Γ is from 1.0×10^{14} to 1.0×10^{16} 1/s.