(Electronic Supplementary Information)

Defining plasmonic cavity performance based on mode transitions to realize highly efficient device design

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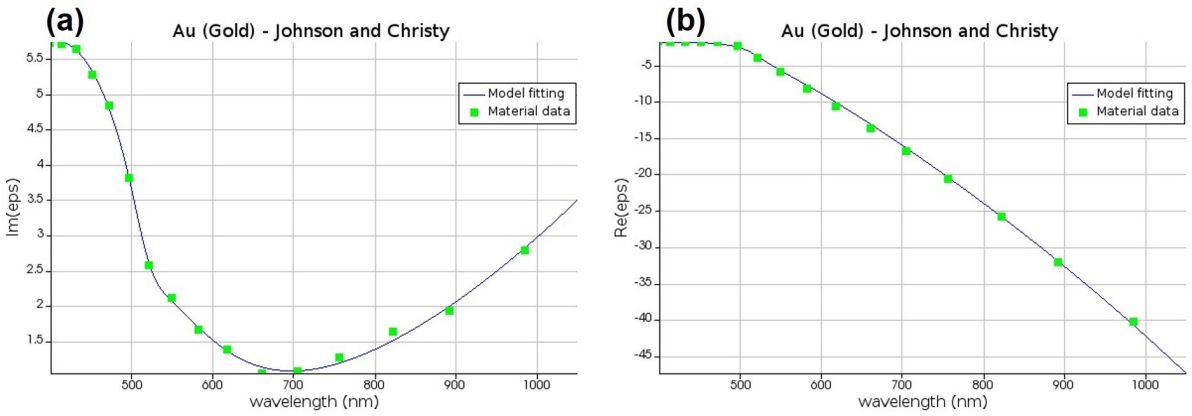

Figure S1. Fitted imaginary (a) and real (b) part of permittivity of gold used in the simulation. The refractive index data base employed is Jonhnson and Christy.

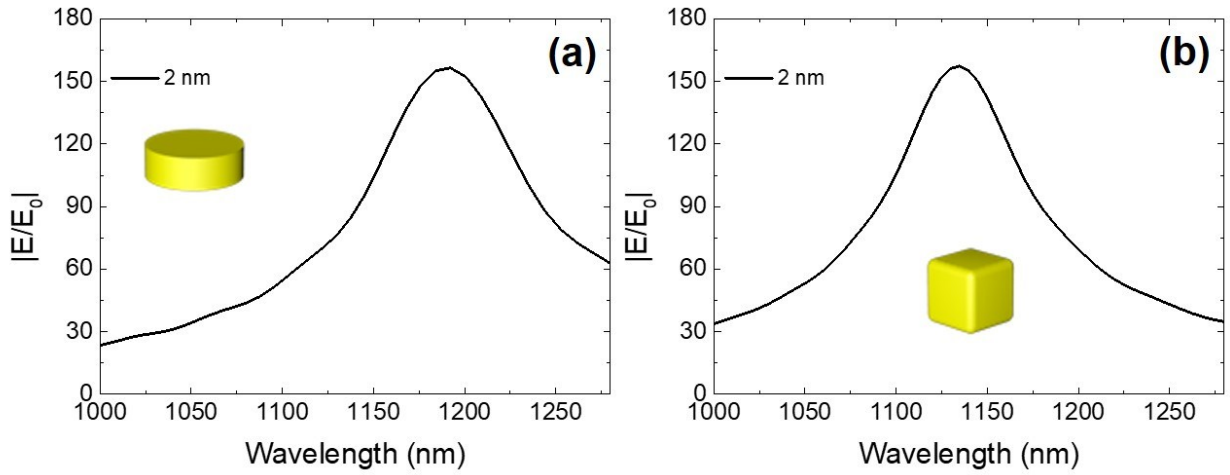

Figure S2. Broadband near-field enhancement spectra for disk- (a) and cube- (b) based NPOM structures with t = 2 nm, covering $|E/E_0|$ $\lambda > 1$ μm.

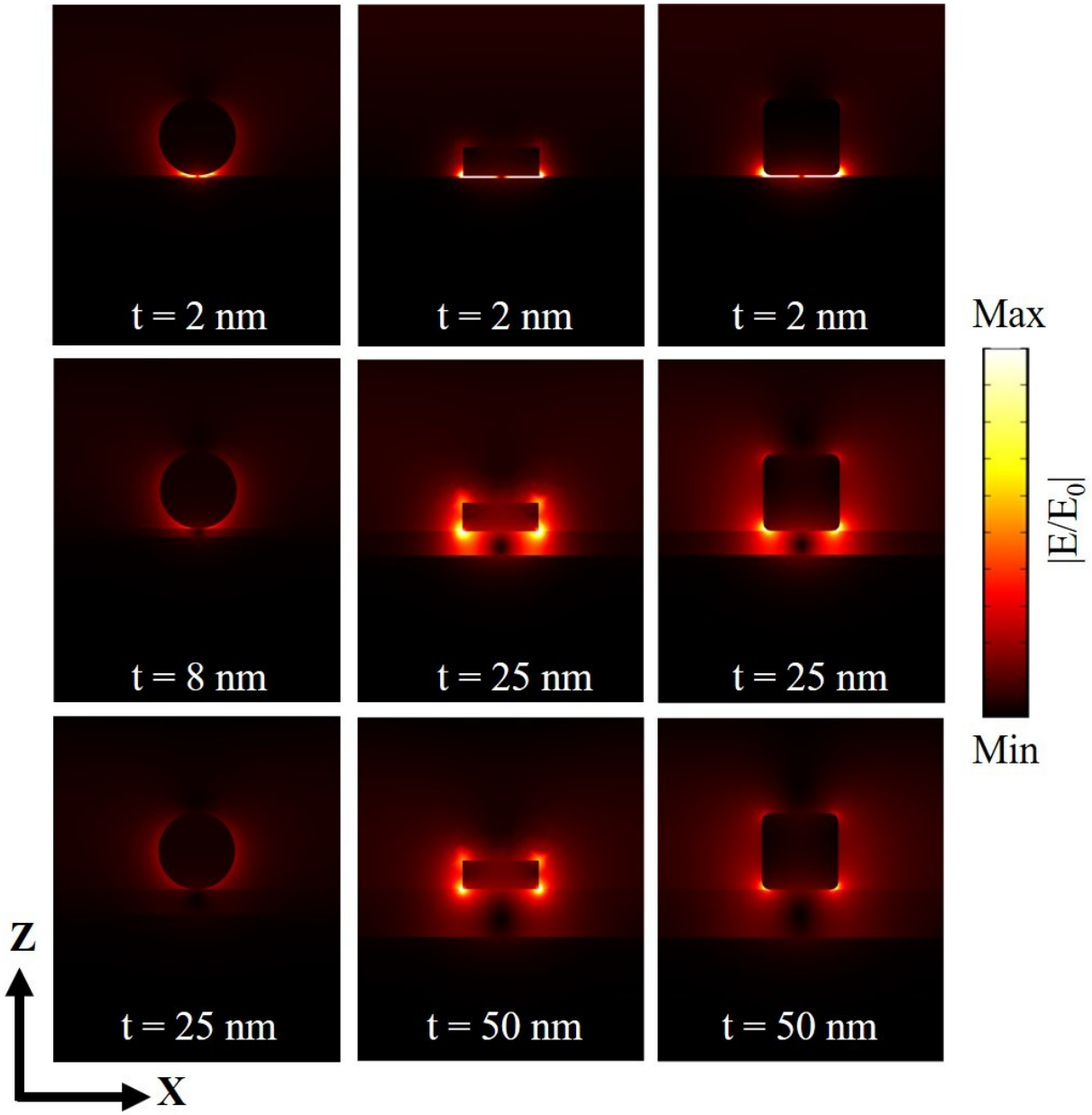

Figure S3. Cross-sectional XZ electric field amplitude profiles for the sphere-, disk-, and cube-based NPOM plasmonic nanostructures, extracted from different classifications of plasmonic nanocavity strength, as described in Figure 3.

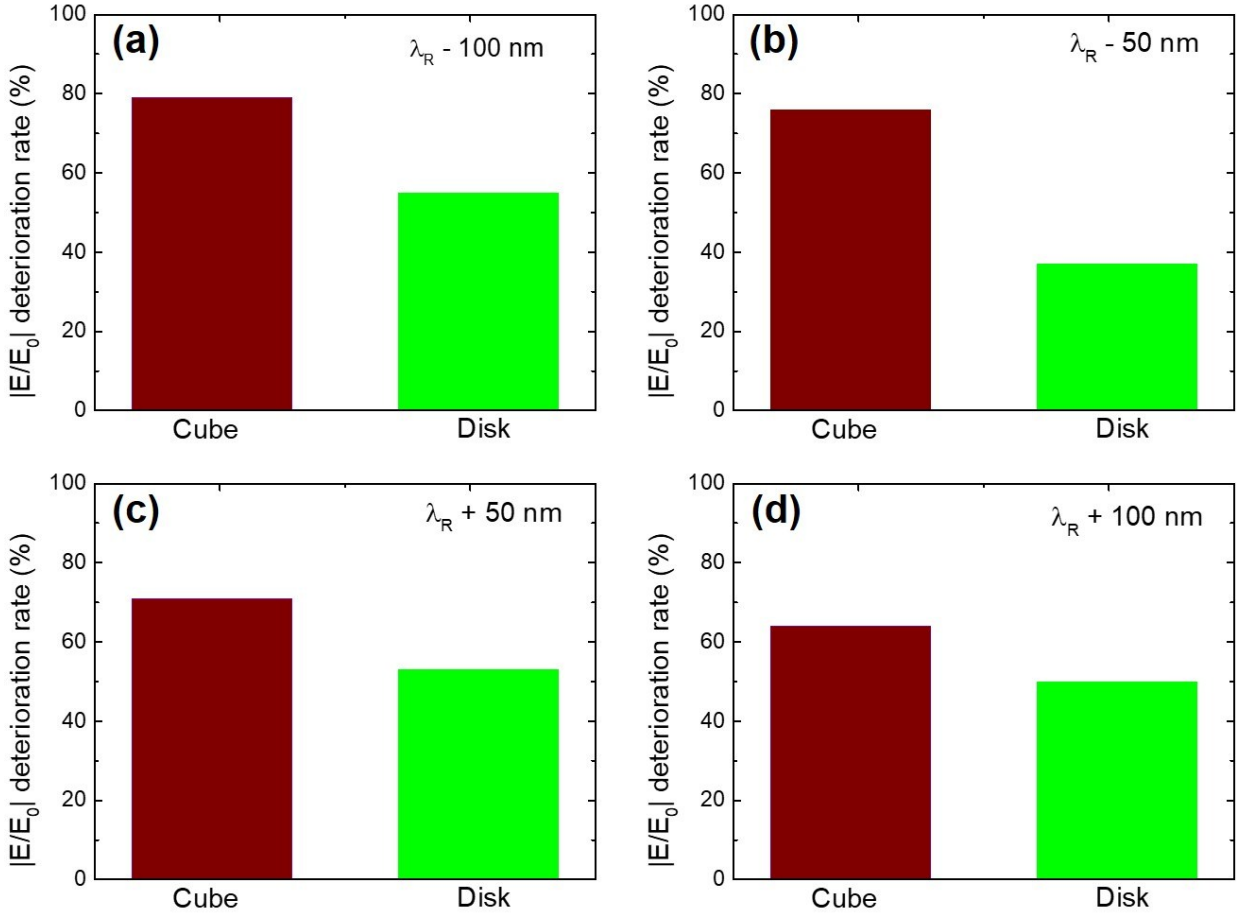

Figure S4. $|E/E_0|$ deterioration rate % for cube- and disk- NPOMs within ± 100 nm range from its resonance position (λ_R). Better results with disk NPOM is observed due to its slower deterioration rate %.

Calculation of the $|E/E_0|$ deterioration rate %:

The rate at which $|E/E_0|$ deteriorated, starting from the simulated minimum t to the maximum t condition with respect to the obtained highest $|E/E_0|$ (here at t = 2 nm), is reported here as the deterioration rate %. For example, consider the sphere NPOM results: at t = 2 nm, the maximum $|E/E_0| = 92$. At t = 25 nm (in the case of the disk or cube, this value is 50 nm), and the maximum $|E/E_0| = 14$. Thus $|E/E_0|$ difference = 78.

$$|E/E_0| \text{ deterioration rate \%} = \frac{\left|E/E_0\right| difference}{Highest \left|E/E_0\right|} * 100$$

$$= \frac{78}{92} * 100$$

$$= 84.8\ \% = \sim 85\%$$