Electronic Supplementary Information

2D-Ordered Dielectric Sub-Micron Bowls on Metal Surface: A Useful Hybrid Plasmonic-Photonic Structure

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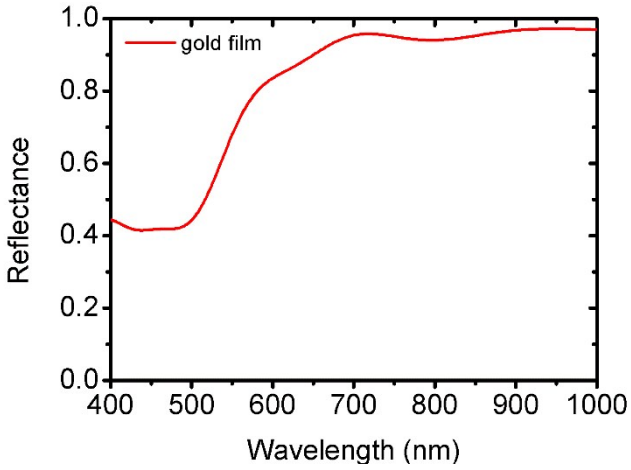

Fig. S1 Calculated reflection spectrum of a flat gold film with a thickness of 50 nm.

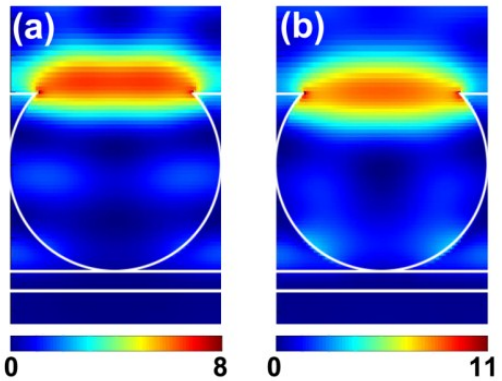

Fig. S2 Calculated electric field distributions at the dips around 520 nm in (a) Fig. 3a and (b) Fig. 3b.

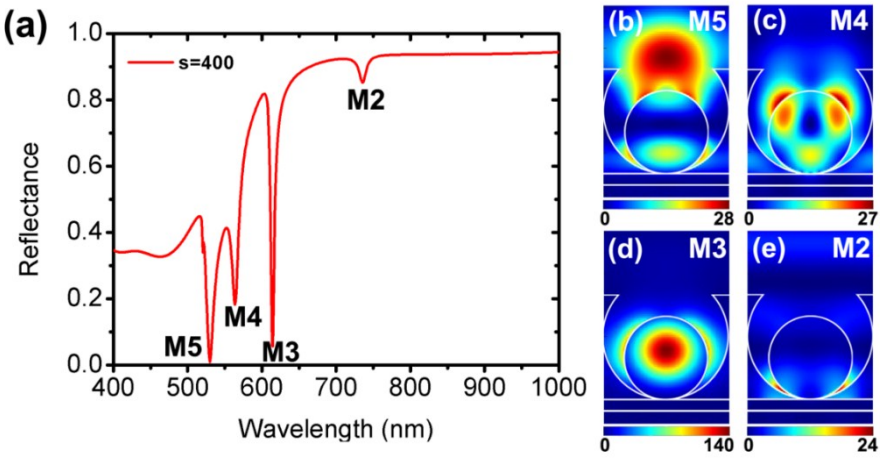

Fig. S3 (a) Calculated reflection spectrum of sub-micron bowls containing 400 nm silica sphere in Fig. 6a and (b-e) electric field distribution corresponding to dips marked in spectrum.

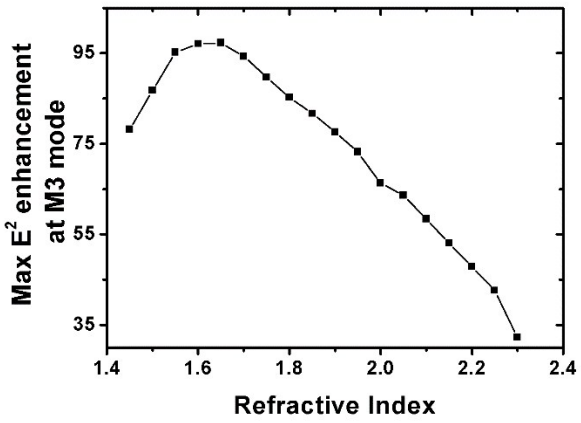

Fig. S4 Evolution of the field enhancement for M3 mode in Fig. 3 by systematically changing the refractive index of the bowls

From the simulation results, we can see the M3 mode has a maximum enhancement factor of about 97 when RI is between 1.6 and 1.7. When increasing RI of the sub-micron bowls, the enhancement factor first increases to a maximum value, and then decreases. The reason is not clear here. We would try to give a reasonable explanation. As shown in Fig. 3a, the dip at M3 located in the decreasing baseline and the decrease is caused by absorption and transmission of semi-transparent gold film (This also can be seen in Fig. S1). When increasing the RI of the sub-micron bowls, the dip position of M3 moves to longer wavelengths (Fig. 3b). The incident energy absorbed and transmitted by gold film would decrease. Hence more incident energy would be confined at M3 modes, resulting in a larger enhancement factor. However, when RI of the nanobowl is larger than a critical value, new modes appeared, as shown in Fig. 3c. The new mode M4 overlaps original M3 mode, making M3 mode nearly covered by M4. Overlap of these modes may weaken the confinement effect of M3 mode, resulting in a decrease of enhancement factor.

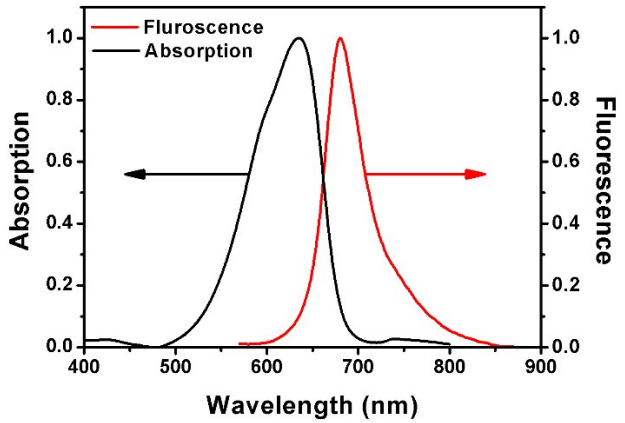

Fig. S5 Normalized absorption spectrum (black line) and fluorescence spectrum (red line) of aqueous solution of Nile Blue A.