# 《电子能量损失谱探测银纳米棒与介质层强耦合的数值模拟》的补充材料

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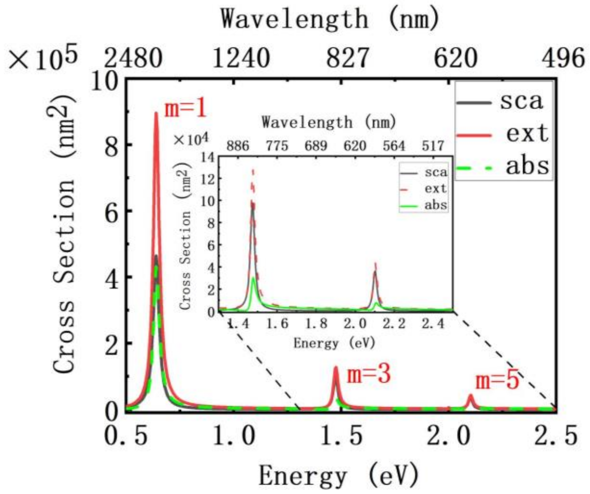


图 S1 长度为 481 nm、直径为 20 nm 的银纳米棒的消光(红色)，吸收(绿色)和散射(黑色)光谱(插图是能量范围在 1.3—2.5 eV 内的光谱放大图)

**Fig. S1.** Extinction (red), absorption (green) and scattering (black) spectra of silver nanorod with length 481 nm and diameter 20 nm, where inset shows magnified part of spectrum in energy range of 1.3— 2.5 eV).

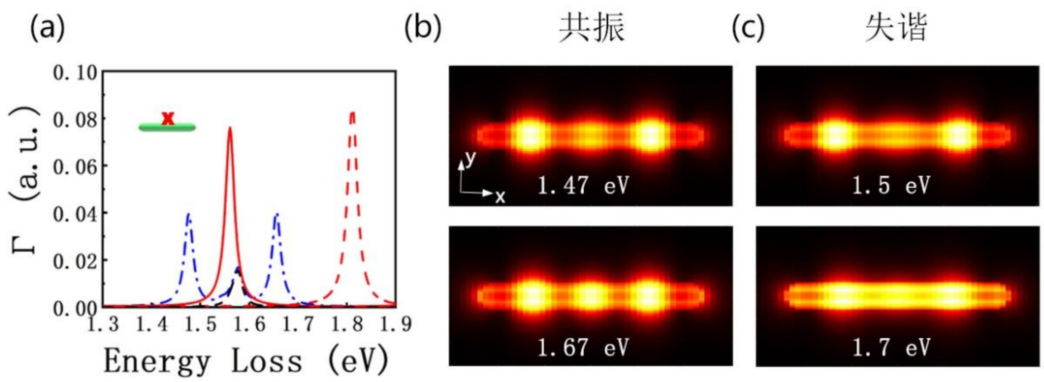


图 S2 利用 EELS 探测可见波段非辐射高阶表面等离激元与介质层激子激发间的强耦合 (a) 电子束作用于介质层中间(黑虚线)、银纳米棒中间(红虚线)及银纳米棒-介质层核壳结构中间(蓝色点线)的电子能量损失谱(由于加上介质层的屏蔽作用，$m = 4$ 高阶非辐射表面等离激元能量发生红移，红移后位置如图中红色实线所示)；红移后 $m = 4$ 高阶非辐射表面等离激元与介质层激子态能量(b)零失谐与(c)失谐时，在不同能量位置处劈裂峰对应的电子能量损失概率空间成像

**Fig. S2.** Strong coupling between visible non-radiative high-order surface plasmons and dielectric layer excitation detected by EELS: (a) Electron energy loss spectrum of electron beam irradiating the middle of dielectric layer (black dotted line), the middle of silver nanorod (red dotted line) and the middle of silver nanorod dielectric layer core-shell structure (blue dotted line) (Due to the shielding effect of dielectric layer, surface plasmon energy of order $m = 4$ is red-shifted, and plasmon position after red-shift is shown by red solid line); spatial distributions of electron energy loss probability for two splitting peaks with different energy values when the surface plasmon energy is (b) zero detuned and (c) detuned from exciton energy of dielectric layer.

 

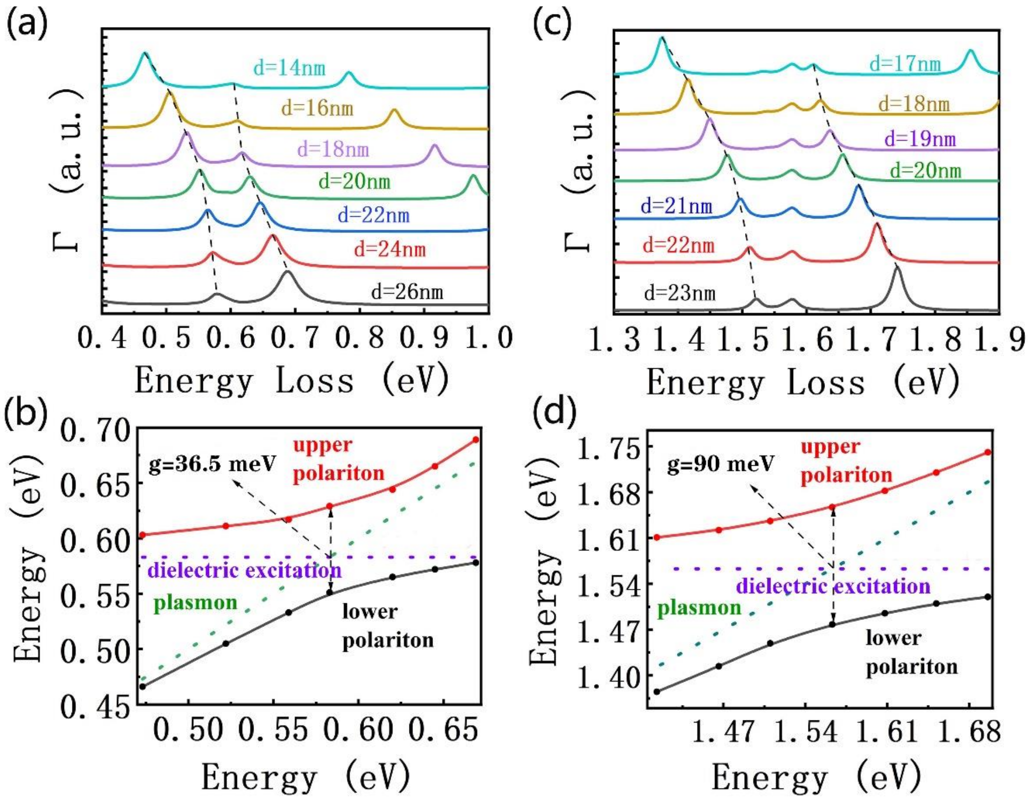


图 S3 红外、可见波段辐射偶极和非辐射高级表面等离激元与介质层的元激发间强耦合导致的反交叉色散关系(a),(c)长度为481 nm、不同直径的银纳米棒-介质层核壳结构的电子能量损失谱，其中虚线标注了上、下杂化等离激子的能量 (a)红外波段；(c)可见波段；(b)，(d)对应的杂化等离激子能量的色散关系，其中横虚线为介质层激发能量，斜直线为银纳米棒的偶极($m$ = 1，4)表面等离激元能量

**Fig. S3.** Anti-crossing dispersion relationship caused by strong coupling between radiative dipolar and non-radiative higher-order plasmon in infrared and visible region and meta excitation of dielectric layer：(a), (c) Electron energy loss spectra of silver nanorod-dielectric layer core-shell structures with a length of 481 nm and different diameters, where dotted lines denote the energy values of the upper and lower plexciton; (b), (d) dispersion relationship of plexciton in panel (a) and panel (c), where horizontal dotted line refers to excitation energy of dielectric layer, and oblique line represents energy of dipole($m$ = 1, 4)radiative plasmon of esilver nanorod.

 