

## Supporting Information

### Confined growth of Ag Nano-flakes Induced by LSPR-driven Carriers Transfer in Periodic Nanopatterned Arrays

Wei Xu<sup>a</sup>, Xiaoyu Zhao<sup>a\*</sup>, Fengyi Zhang<sup>a</sup>, Jia Liu<sup>a</sup>, Kun Zhang<sup>a</sup>, Xiaojie Guo<sup>a</sup>, Jiahong Wen<sup>b,d</sup>, Jian Zhang<sup>a</sup>, Xiaolian Liu<sup>a</sup>, Yaxin Wang<sup>a,\*</sup>, Shikuan Yang<sup>c,\*</sup>, Yongjun Zhang<sup>a</sup>

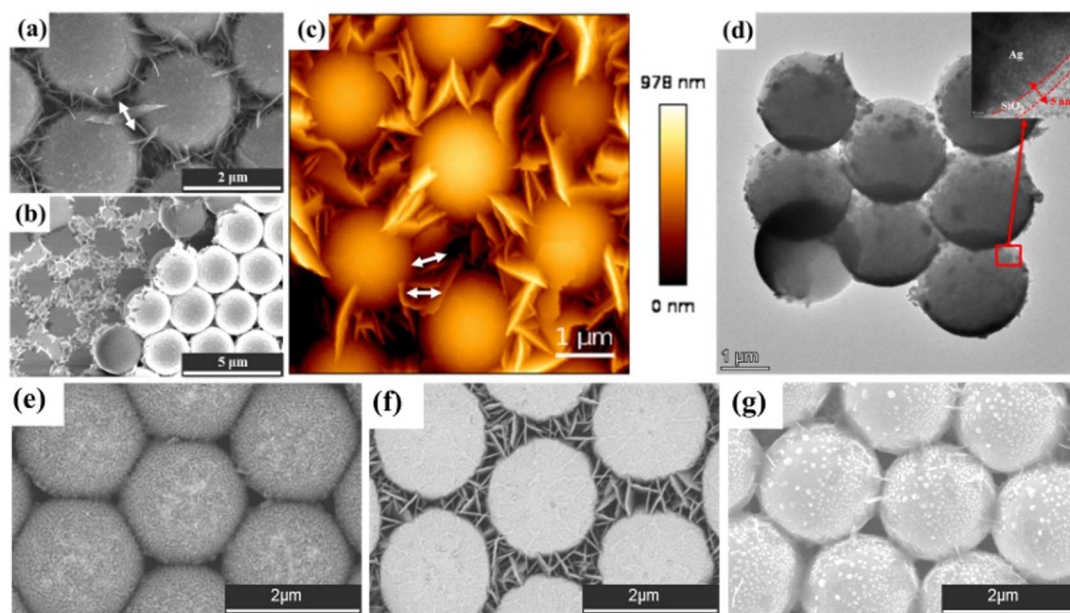
(a) College of Materials and Environmental Engineering, Hangzhou Dianzi University, Hangzhou 310018, P. R. China

(b) The College of Electronics and Information, Hangzhou Dianzi University, Hangzhou 310018, P. R. China

(c) Institute for Composites Science Innovation, School of Materials Science and Engineering, Zhejiang University, Hangzhou 310027, P. R. China

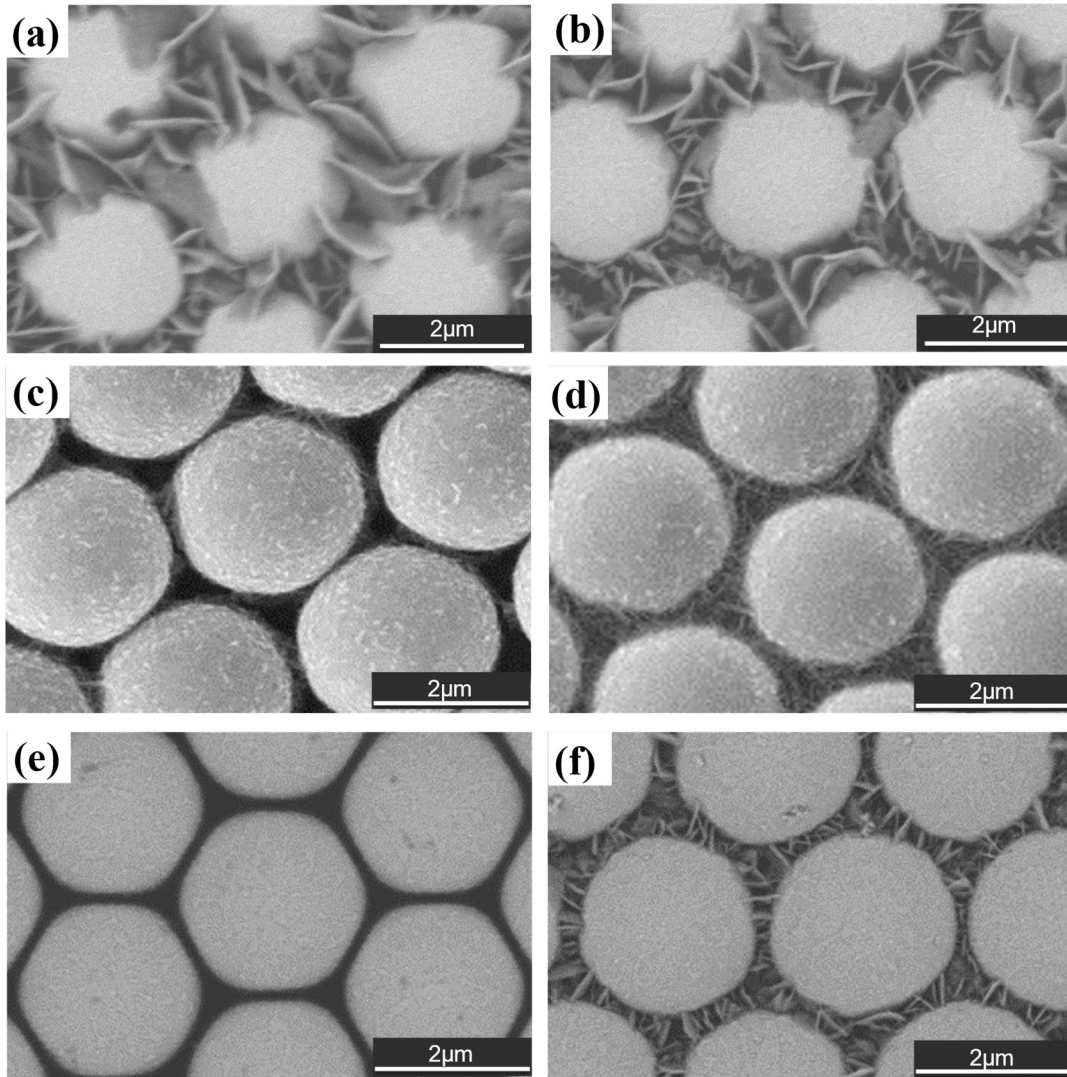
(d) Zhejiang Laboratory, Hangzhou 311100, P. R. China

Corresponding Authors: Xiaoyu Zhao [zhaoxy@hdu.edu.cn](mailto:zhaoxy@hdu.edu.cn); Yaxin Wang, [yaxinwang@hdu.edu](mailto:yaxinwang@hdu.edu); Shikuan Yang, [shkyang@zju.edu.cn](mailto:shkyang@zju.edu.cn);

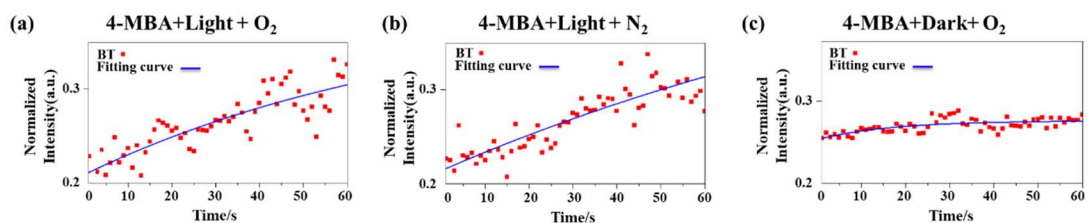


**Fig. S1** (a-b) SEM diagram of nanoflakes. (c) AFM diagram of nanoflakes. (d) The SiO<sub>2</sub> thickness is observed in TEM image. (e) SEM diagram of the sample with silicon dioxide layer thickness of 0nm after growth reaction. (f) SEM diagram of the sample with silicon dioxide layer thickness of 5nm after growth reaction. (g) The SEM diagram

of the samples with the thickness of silicon dioxide layer above 10nm after growth reaction.



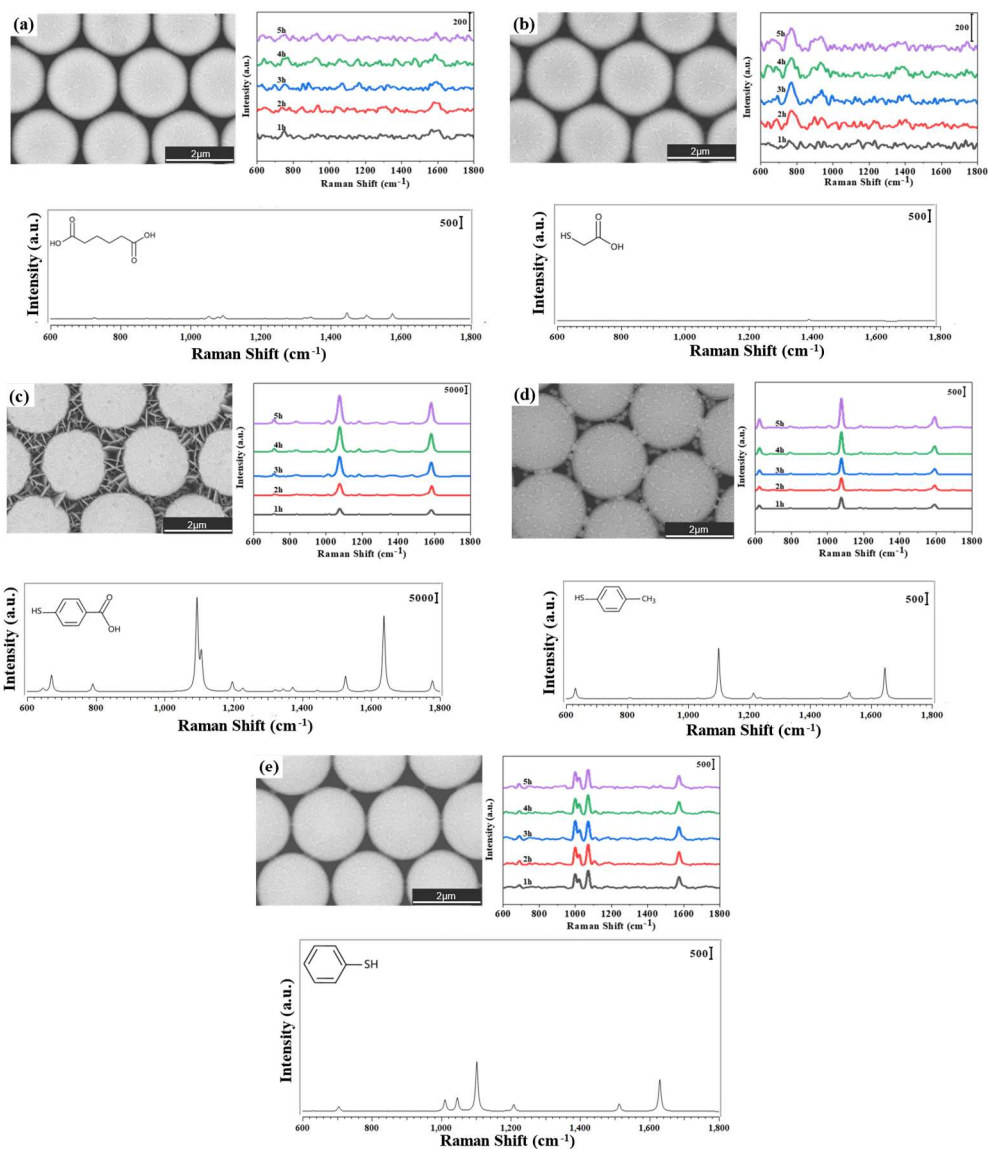
**Fig. S2** (a) SEM diagram of sample in oxygen-free environment for 4 h. (b) SEM diagram of sample in nitrogen environment for 4 h. (c) Samples soaked in molecular solution without light irradiation. (d) Samples soaked in molecular solution with light irradiation. (e) SEM diagram with hot hole annihilator. (f) SEM diagram without hot hole annihilator.



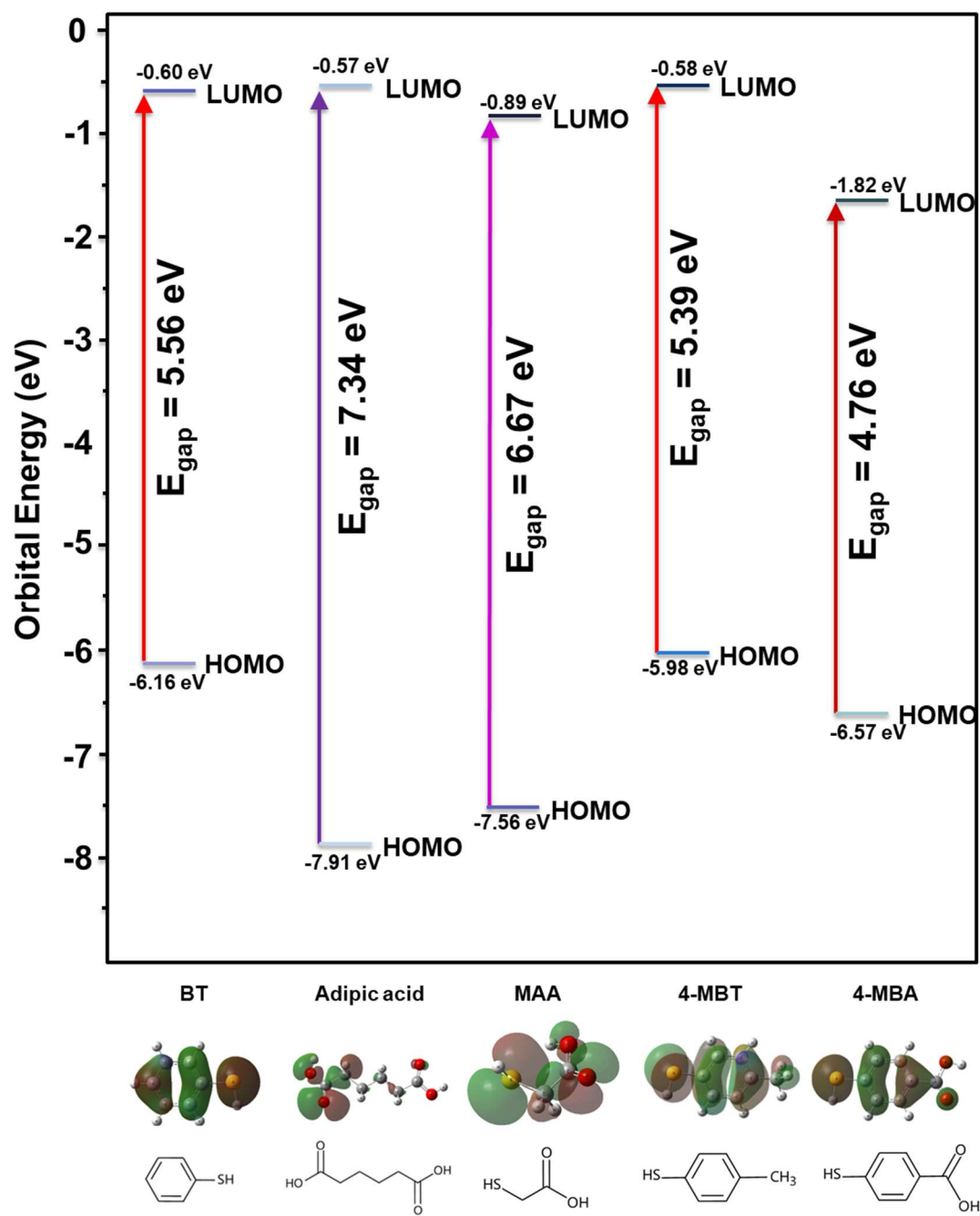
**Fig. S3** The changing trend of product peak normalized intensity with time under different conditions within three minutes (a) 4-MBA, 785nm, 0.5w, O<sub>2</sub>. (b) 4-MBA, 785nm, 0.5w, N<sub>2</sub>. (c) 4-MBA, 785nm, 0.3w, O<sub>2</sub>.

$$y = A_1 \times e^{-\frac{x}{t_1}} + y_0$$

**Formula. S1** The normalized Raman strength curves are all fitted based on this formula. where  $A_1$  refers to amplitude,  $t_1$  refers to time constant,  $y_0$  refers to offset.



**Fig. S4** Raman experimental data and calculation results of five molecules and SEM image for (a) Adipic acid; (b) Thioglycolic acid (MAA); (c) 4-Mercaptobenzoic acid (4-MBA); (d) P-methyl thiophenol (4-MBT); (e) BT.



**Fig. S5** The HOMO distribution and HOMO-LUMO energy gaps for five molecules, BT, Adipic acid, MAA, 4-MBT and 4-MBA.