

Electronic Supplementary information for

Enhanced Photoluminescence from SiO_x-Au Nanoflowers

Hu Luo,^{a, b} Rongming Wang,^{*a} Yanhui Chen,^b Daniel Fox,^b Robert O'Connell,^b
Jing Jing Wang^b and Hongzhou Zhang^{*b}

^a Department of physics, Beijing University of Aeronautics & Astronautics, Beijing 100191, P. R. China

^b School of Physics, Center for Research on Adaptive Nanostructures and Nanodevices (CRANN), and
CRANN Advanced Microscopy Laboratory (CRANN AML), Trinity College Dublin, Dublin 2, Ireland

*Corresponding author: Rongming Wang: rmwang@buaa.edu.cn, Hongzhou Zhang: hozhang@tcd.ie

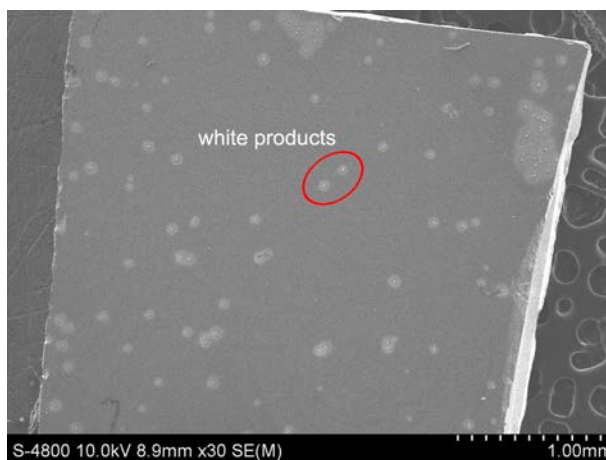


Fig. S1 Lots of white dot products of about 100 μm grew on the substrate by annealing the silicon wafer deposited with Au thin film at 1100°C for 3 minutes, as shown in the red circle. Further SEM characterization showed that the white products were silicon oxide-Au nanoflowers.

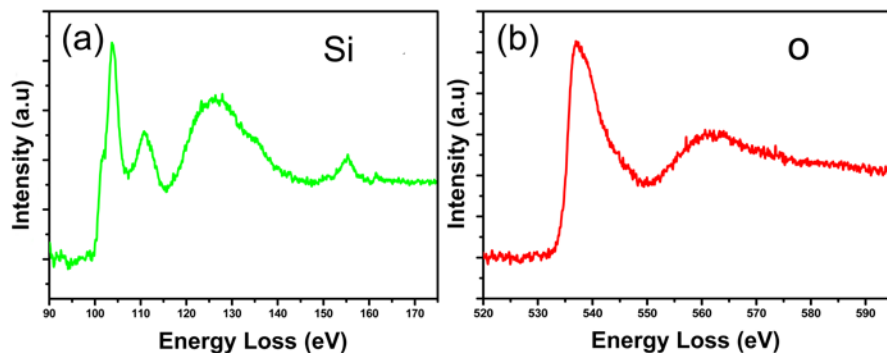


Fig. S2 EELS spectrum of the silicon oxide nanoflowers. (a) and (b) are the Si and O EELS spectra, respectively, which also reveals that the nanoflowers have amorphous silicon oxide phase by comparing to the standard EELS spectrum for amorphous silica¹.

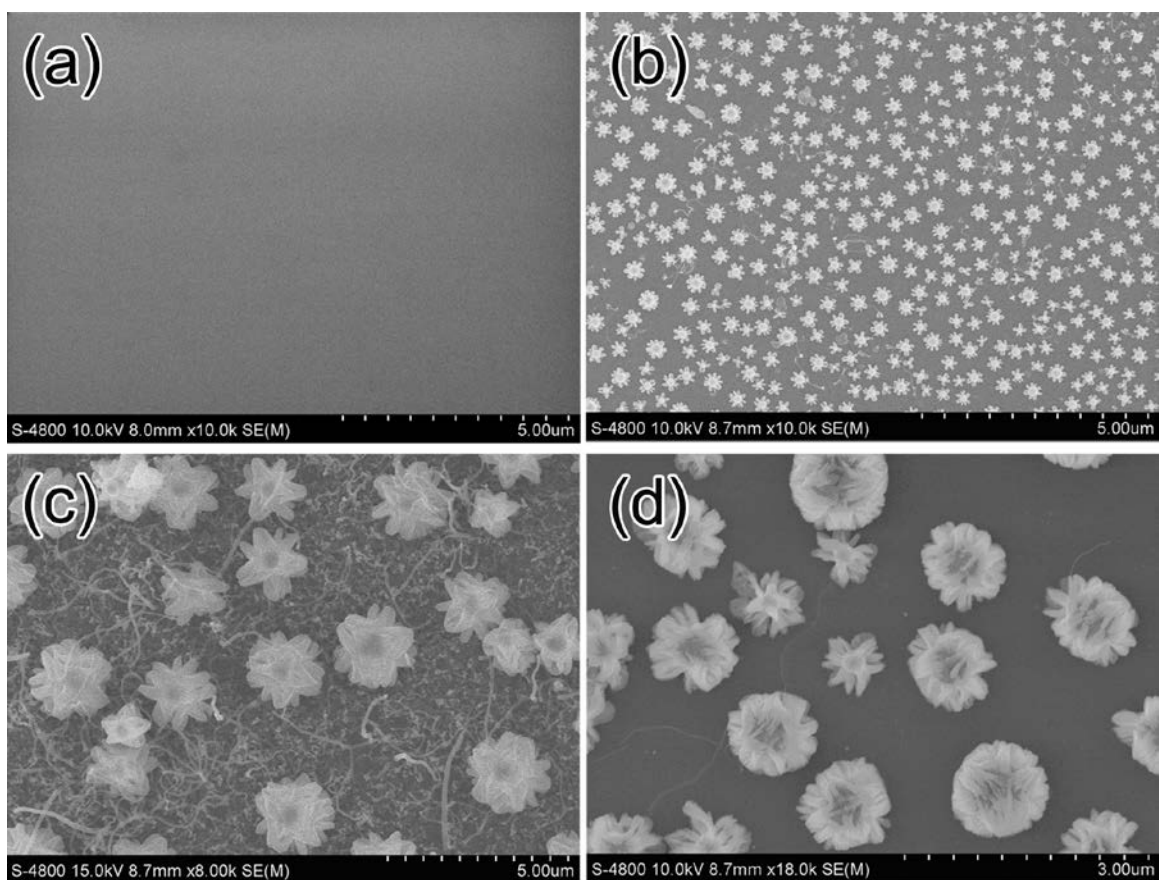


Fig. S3 (a) SEM image of bare silicon substrate after annealing. No any SiO_x nanostructures can be found on the substrate. (b), (c), (d) SEM images of SiO_x synthesized at different reaction time. The reaction time of (b), (c), (d) is 10min, 30min and 45 min, respectively. The images indicate that the longer the synthesis time the

longer the length of the structure and the larger number of them protruding from the particles. It can be seen that the SiO_x branches almost cover the whole Au nanoparticle at the case of 45 min.

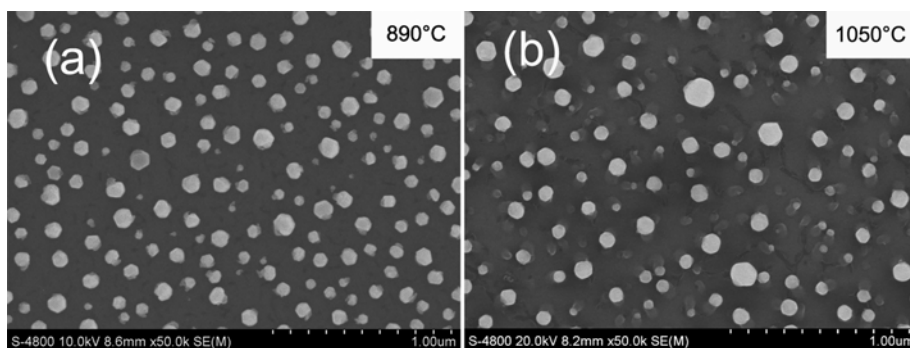


Fig. S4 Silicon substrate coated Au thin film were annealed in the protect atmosphere of H_2/Ar mixed gas at 890°C , 1050°C , respectively. (a) only Au-Si eutectic nanoparticles were found on the Si substrate after annealing, (b) there were still no silicon oxide-Au nanoflowers or nanowires grew from the substrate, but some resultant adhere to the smaller silicon oxide-Au nanoparticles that is different from the 890°C result. It means that it has the tendency to grow silicon oxide nanostructures.

REFERENCE

1. K. H. Lee, S. W. Lee, R. R. Vanfleet and W. Sigmund, *Chem Phys Lett*, 2003, **376**, 498-503.