Electronic Supplementary Material (ESI) for RSC Advances

Supporting Information for

Template-free synthesis of hierarchical flower-like platinum counter electrode and its application in dye-sensitized solar cells

Ziying Tang, Qunwei Tang, Jihuai Wu*, Yan Li, Qin Liu, Min Zheng, Yaoming Xiao, Gentian Yue, Miaoliang Huang and Jianmin Lin

Institute of Materials Physical Chemistry, Huaqiao University, Quanzhou, 362021, P. R. China. Fax: (+86) 595-22692229; TEL: (+86) 595-22692229; E-mail: jhwu@hqu.edu.cn

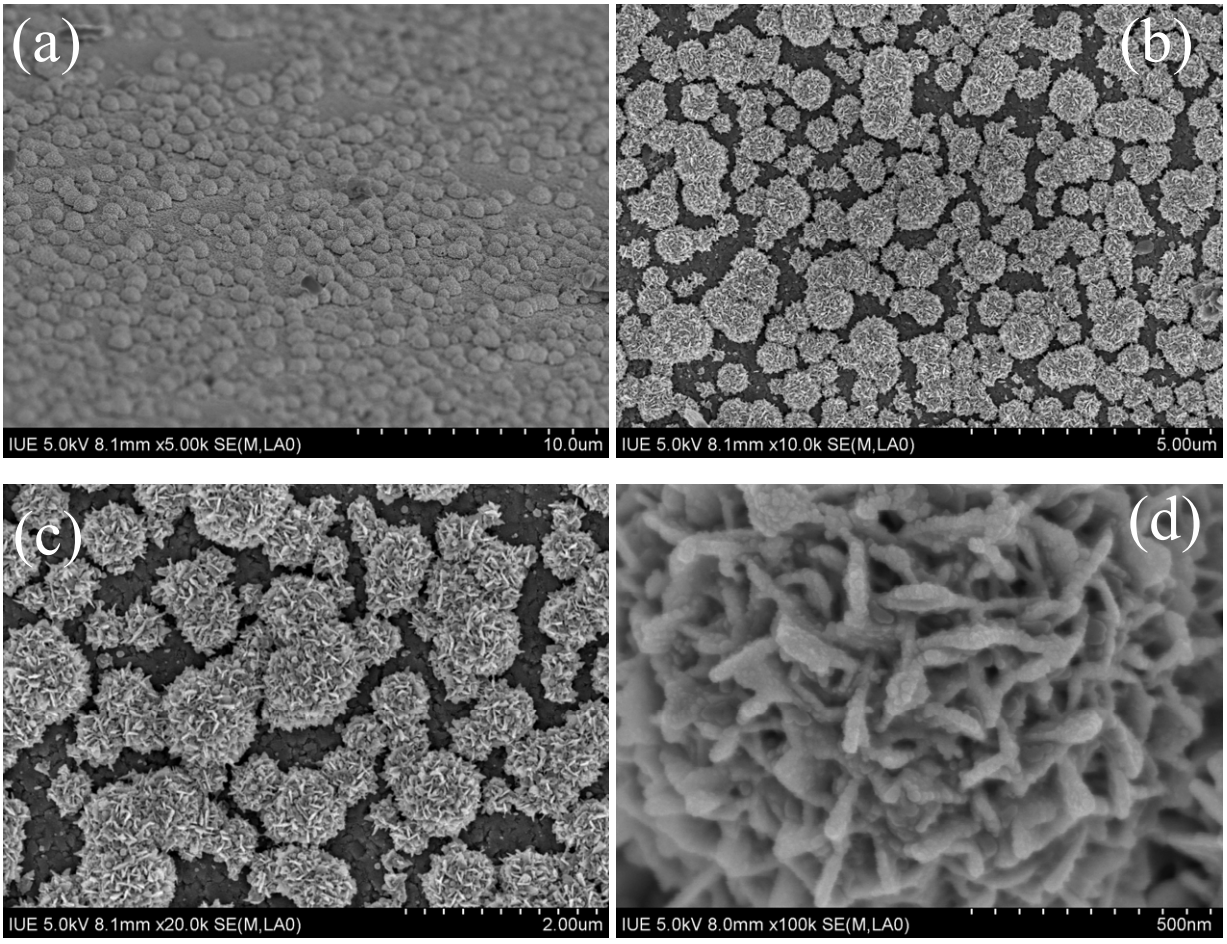

Fig S1. SEM images of flower-like Pt counter electrode at lower (a,b,c) or higher magnifications (d).

Fig. S1 gives more SEM images for flower-like Pt counter electrode at lower (a,b,c) or higher

magnifications. From the lower magnification SEM images, we can see that the Pt "flowers" uniformly and continuously exist in large area instead of only exist in small area. From the maginificated SEM image we can clearly see that the diameter of the petal-like Pt nanosheets on Pt "flowers" is around 25-30 nm. Additionally, numerous of pores appear on the surface of Pt "flowers", such structure is advantage for the absorption of liquid electrolyte with I^-/I_3^- redox couple.

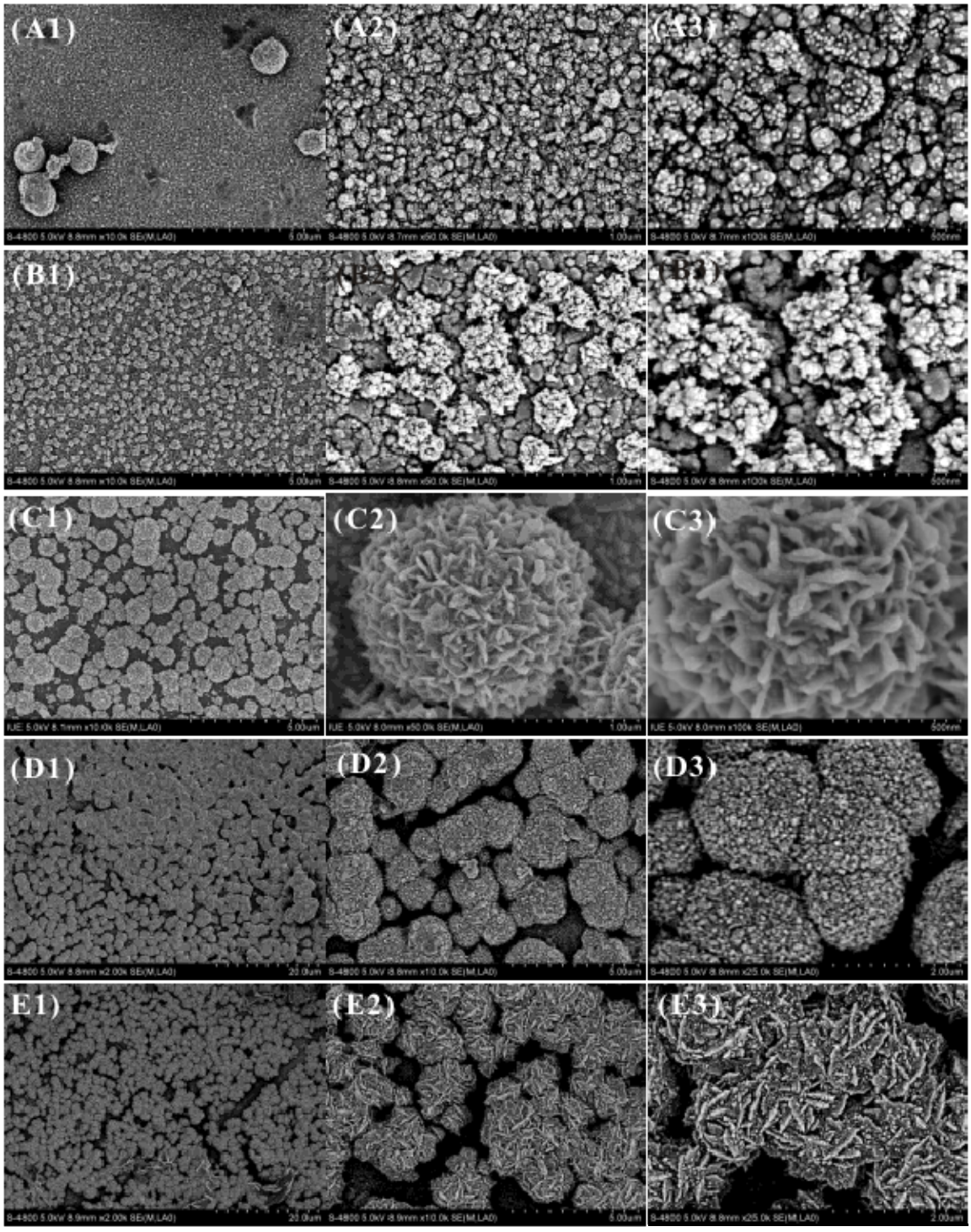

Fig S2. The SEM images of the Pt counter electrodes prepared at different concentration: (A_1-A_3) 0.01 M; (B_1-B_3) 0.015 M; (C_1-C_3) 0.02 M; (D_1-D_3) 0.1 M; (E_1-E_3) 0.5 M.

According to the SEM observation, the flower-like structure can only be observed at the H_2PtCl_6 concentration of 0.02 M. According to the SEM observation, one can see that flower-like Pt electrodes are obtained at H_2PtCl_6 of 0.02, 0.1 and 0.5 M. However, the size of the Pt flowers become larger and larger with concentration. Much lower concentration, such as lower than 0.02 M, the ball-like Pt structure is composing of nanoparticles instead of nanosheets, but, we can find there is a trend to form Pt flowers on the concentration order of 0.01 M—0.015 M—0.02 M. Therefore, we can conclude that there is not a critical concentration to form such an unique structure. In our conditions, 0.02 mM of H_2PtCl_6 solution is the best concentration to synthesize flower-like Pt nanostructure with enhanced cell performances.