Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A

Supporting Information

Unusual Particle-Size-Induced Promoter-to-Poison Transition of ZrN in Counter Electrodes for Dye-sensitized Solar Cells

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1. SEM images of ZrN with ball-milling, which were obtained using a Hitachi-4700 field emission scanning electron microscope (FESEM).

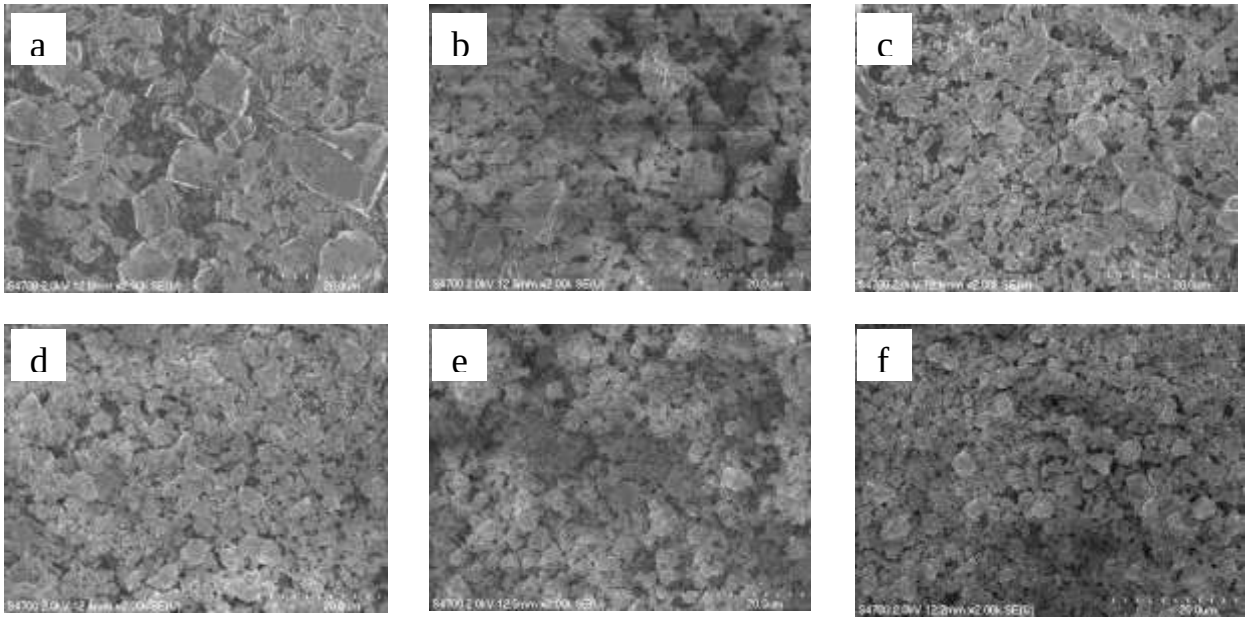

Figure 1S. *FESEM images of: (a) ZrN without ball-milling, (b) ZrN with ball-milling for 10min, (c) ZrN with ball-milling for 30min, (d) ZrN with ball-milling for 1h, (e) ZrN with ball-milling for 5h, and (f) ZrN with ball-milling for 10h.*

2. The sizes of secondary particles of ZrN with ball-milling, which were estimated from SEM images.

Table 1S. Secondary particle sizes of ZrN with various ball-milling times

Ball-milling time (min)	Size range of secondary particles (nm)
0	1000-20000
10	500-10000
30	200-5000
60	80-3000
300	40-2000
600	20-1000

Note: The sizes of secondary particles (comprised of primary crystal particles) from SEM are much larger than corresponding primary crystal particle sizes obtained from XRD (Table 3).