Supporting Information

Carbon dots-assisted hydrothermal synthesis of flower-like MoS_2 nanospheres constructed by few-layered multiphase MoS_2 nanosheets for supercapacitor

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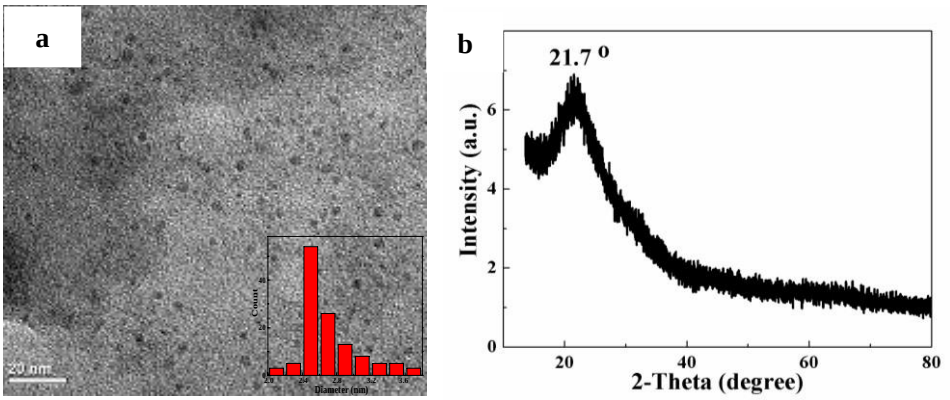


Figure S1 (a) TEM image and (b) XRD pattern of the as-prepared CDs. Inset in (a) is corresponding size distribution histogram.

The morphology and crystal phase structure of the as-prepared CDs were investigated by TEM and XRD measurements (Figure S1). TEM image shows that CDs are quasi-spherical and well-dispersed (Figure S1(a)). They have a narrow size distribution with the diameters around 2.5 nm (Figure S1(a) inset). XRD pattern of the as-prepared CDs displays a broad and weak diffraction peak centered at 21.7^o with the calculated interlayer spacing of 0.41 nm based on Bragg equation (Figure S1(b)), which represents the inter-planar (*d*-spacing) graphitic stacking. This value is same as that of reported nitrogen and sulfur co-doped CDs (N/S-CDs, 0.41 nm)[1], and is larger than that of the (002) plane of bulk graphite (0.34 nm). The increased *d*-spacing can be ascribed to the effects of abundant functional groups at the edges of CDs, which

enlarge the spacing of graphite-like carbon layers.[2]

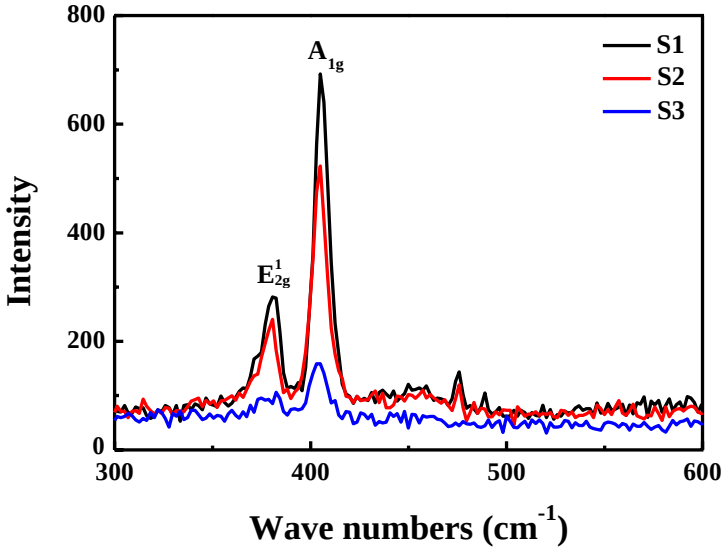
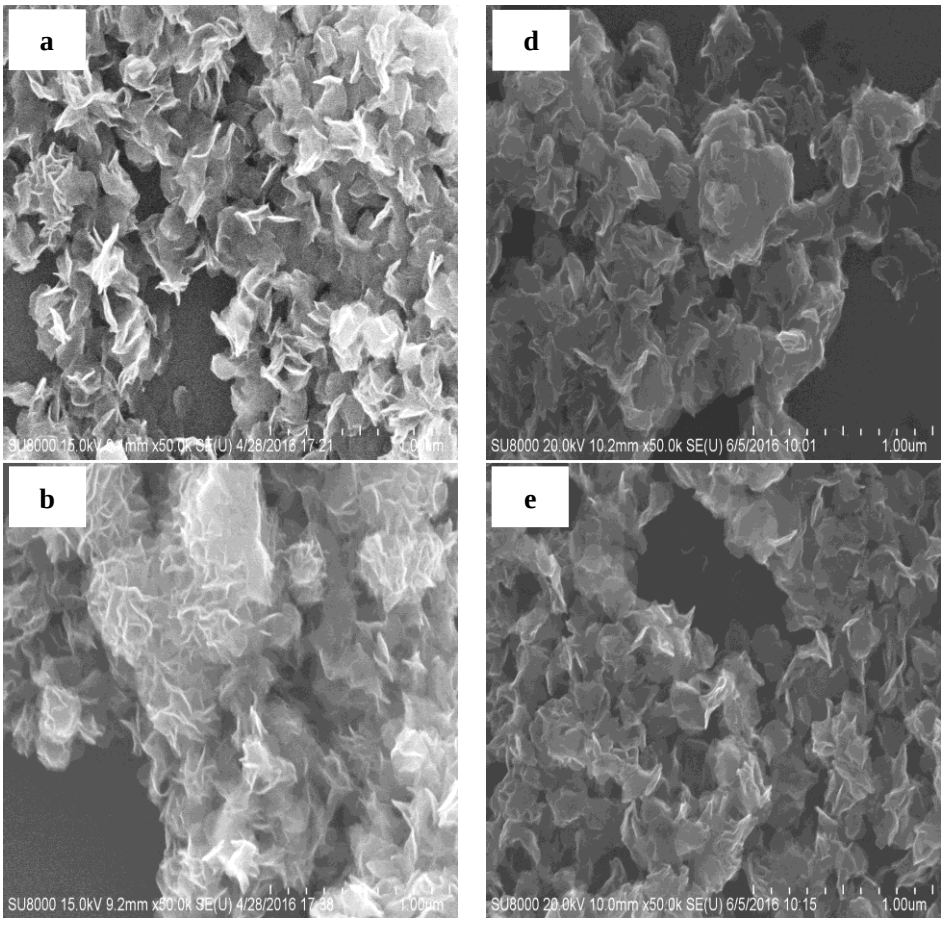


Figure S2 Raman spectra of various MoS_2 synthesized with the assistance of CDs of 5 mg (S1), 10 mg (S2) and 20 mg (S3).



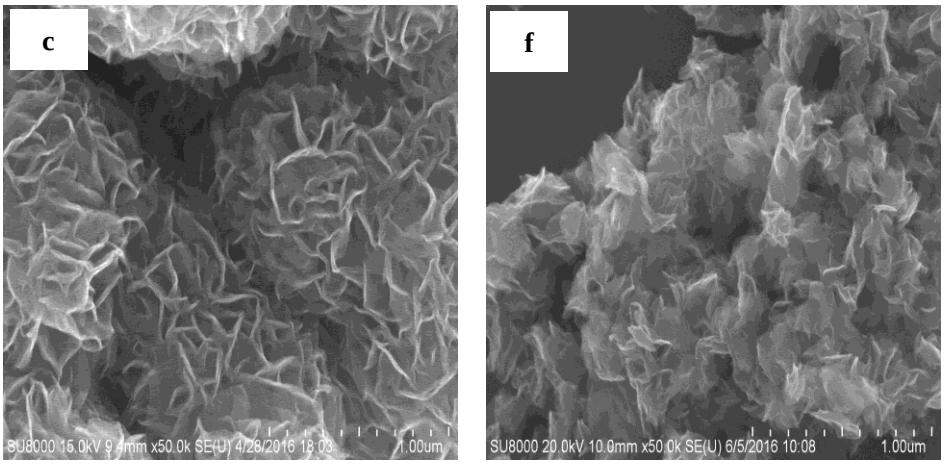


Figure S3 SEM images of MoS_2 obtained in the presence (left panel) or absence of CDs (right panel) in the synthetic time of 1.5 h (a, d), 2.0 h (b, e) and 2.5 h (c, f).

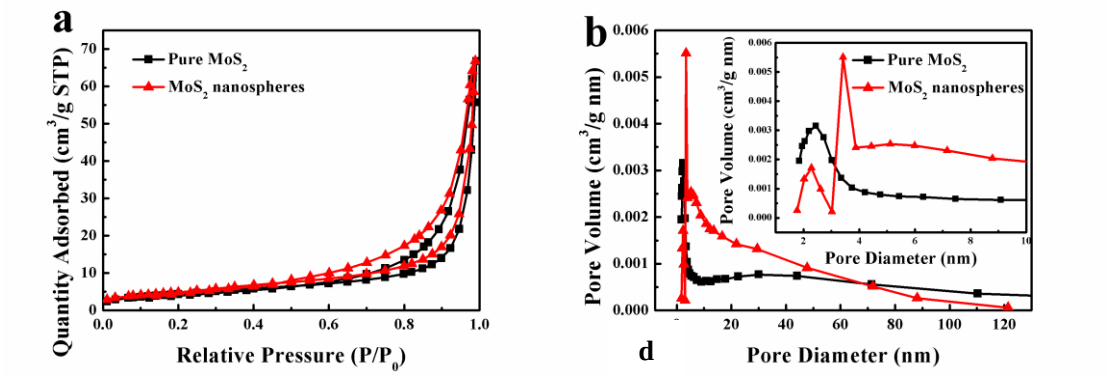


Figure S4 (a) N_2 adsorption and desorption isotherms and (b) pore size distribution of different MoS_2 obtained in the absence or presence of CDs. Inset in (b) is the curve of a selected region (pore diameter less than 10 nm).

References

[1] Peng J, Gao W, Gupta BK, Liu Z, Romero-Aburto R, Ge L, et al. Graphene quantum dots derived from carbon fibers. Nano letters 2012; 12(2):844-9.

[2] Hu YP, Yang J, Tian JW, Jia L, Yu YS. Waster frying oil as a precursor for one-step synthesis of sulfur-doped carbon dots with pH-sensitive photoluminescence. Carbon 2014; 77:775-82.