Electronic Supplementary Material (ESI) for RSC Advances.

Laterally-Uniform Mn_3O_4 Colloidal Nanosheets: Oriented Growth and Size-Controlled Synthesis

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Experimental Section

All chemicals were purchased from Aladdin and used as received without further purification.

Synthesis of Mn_3O_4 nanosheets: In a typical synthesis, 0.490 g of manganous acetate tetrahydrate ($Mn(Ac)_2{\cdot}4H_2O$), 0.142 g of stearic acid (SA) and 40 mL of 1-octadecene (ODE) were mixed in a 100 mL Schlenk flask and stirred at 90 ℃ for 10 min under an atmosphere of argon. Then the above solution was heated to 210 ℃ at a speed of 10 ℃min^{-1}, reacted at 210 ℃ for 3 h and aged at 270 ℃ for 5 min. During this process, the initial solution gradually changed from light brown to dark brown. The resulting reaction mixture was cooled to room temperature to form a brown suspension naturally, and the products were precipitated by adding a large amount of ethanol followed by three cycles of centrifugation at 5000 rpm to remove excess SA and ODE. The nanosheets after washing were well dispersed in organic solvents such as cyclohexane, n-hexane and toluene. Furthermore, the temperatures and times of the aliquots taken at nucleation, agglomeration and coalescence stages were 0 min (210 ℃), 5 min (210 ℃) and 15 min (210 ℃). Mn_3O_4 nanosheets with controlled size were

simply synthesized by feeding different molar concentration of SA in the reaction systems.

Characterization: Transmission electron microscopy (TEM) and high resolution TEM (HRTEM) were performed on a JEOL JEM-2000EX microscope with selected area electron diffraction (SAED) capability. The samples were prepared by dropping the nanosheets onto carbon coated copper grids with excess solvent evaporated. X-ray photoelectron spectroscopy (XPS; Shimadzu, Amicus) and energy dispersive spectrometer (EDS; Ametek) were also used to characterize the nanosheets. X-ray powder diffraction (XRD; Bruker, D8-Discover, Cu Kα, λ= 0.15405 nm, 40 kV/30 mA) measurements of the samples were recorded in the range 5 - 80 ° at the speed of 2 °/min.

Fig. S1 XPS spectrum of the O 1s region of the as-synthesized nanosheets.

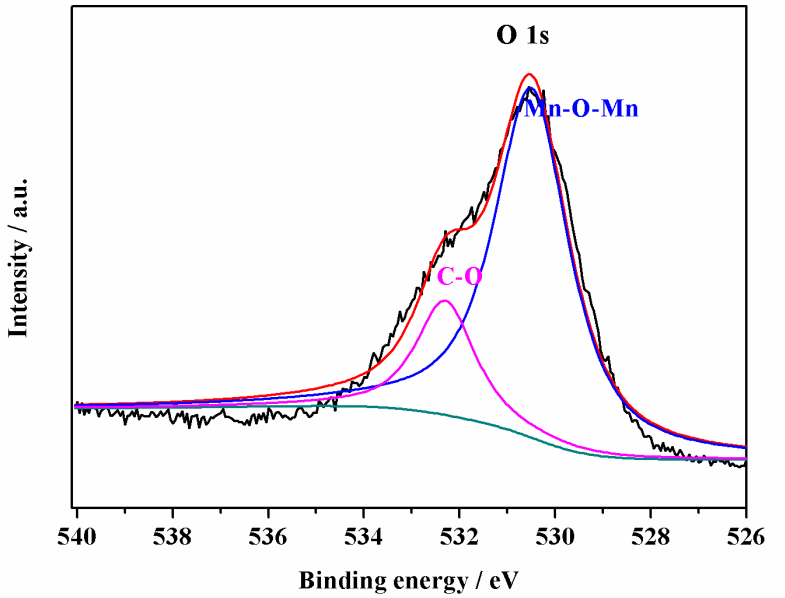

Fig. S2 SAED pattern of the Mn_3O_4 nanosheets

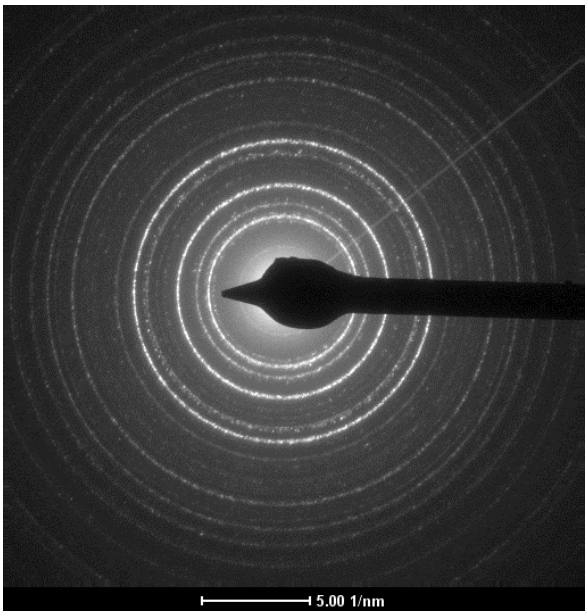

Fig. S3 EDS spectrum of the nanosheets

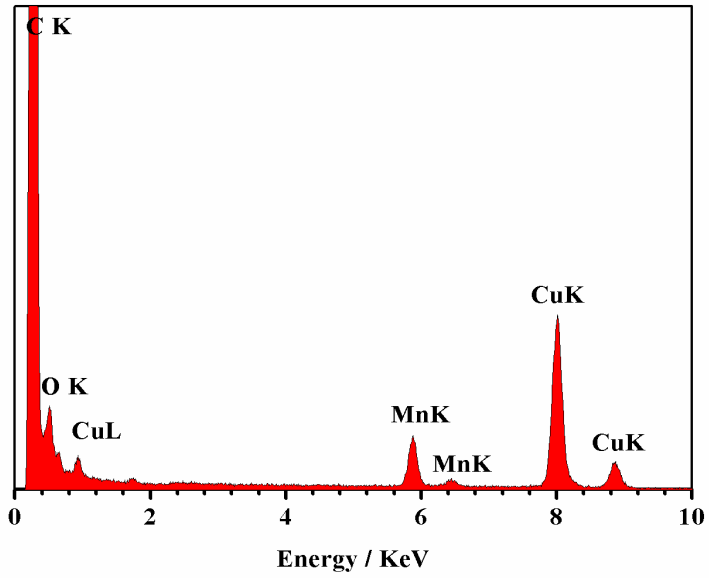

Fig. S4 Size distribution histogram of the sheets in Fig. 1c.

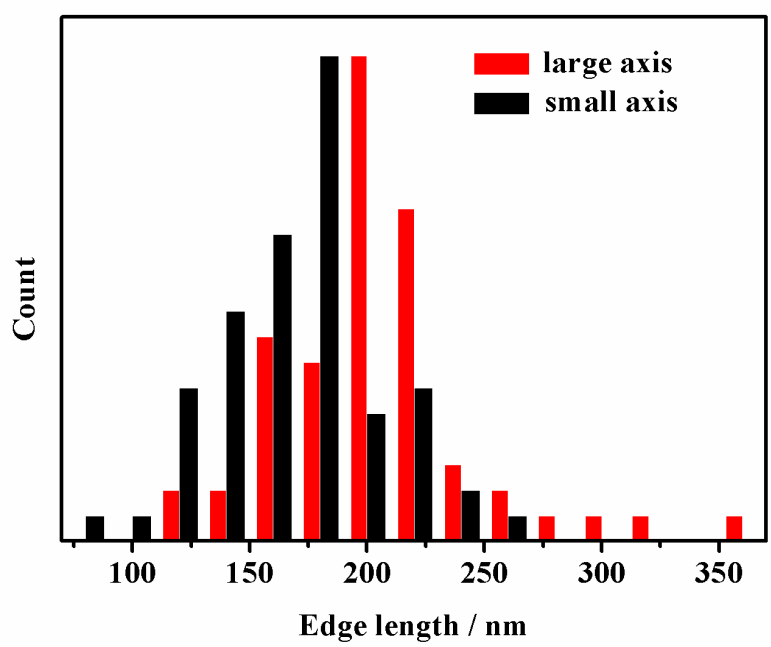

Fig. S5 TEM and HRTEM images of aliquots taken during the coalescence stage of the formation.

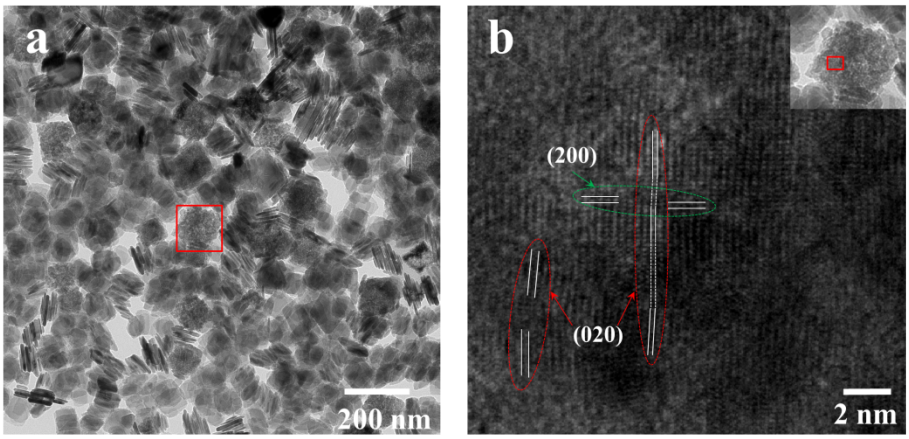

Fig. S6 TEM images of the as-synthesized Mn_3O_4 nanostructures at (a) 180 ℃ and (b) 250 ℃.

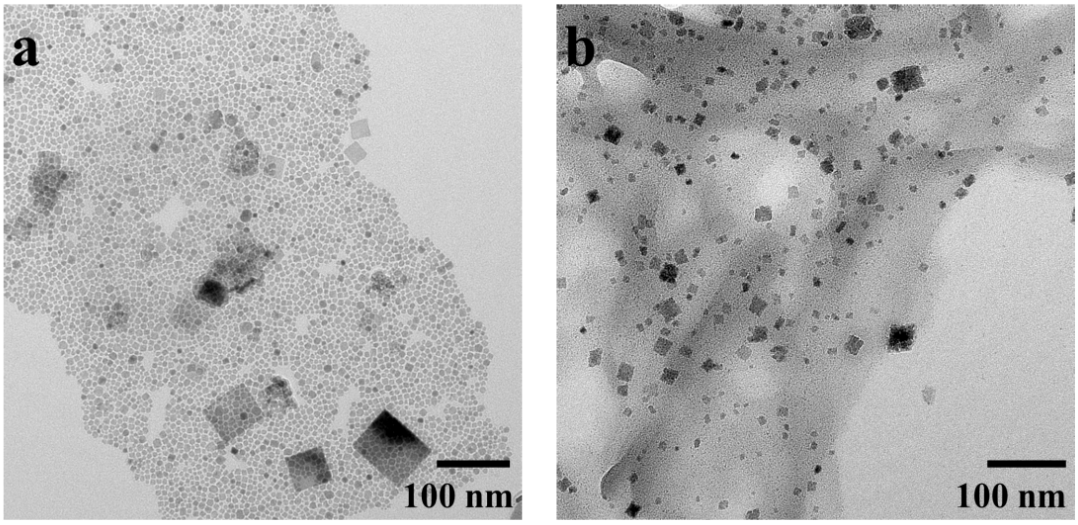

Fig. S7 TEM images and thickness statistical charts of nanosheets synthesized in presence of different feeding molar concentration of SA: (a) 25 $mmolL^{-1}$, (b) 50 $mmolL^{-1}$, (c) 100 $mmolL^{-1}$, and (d) 200 $mmolL^{-1}$.

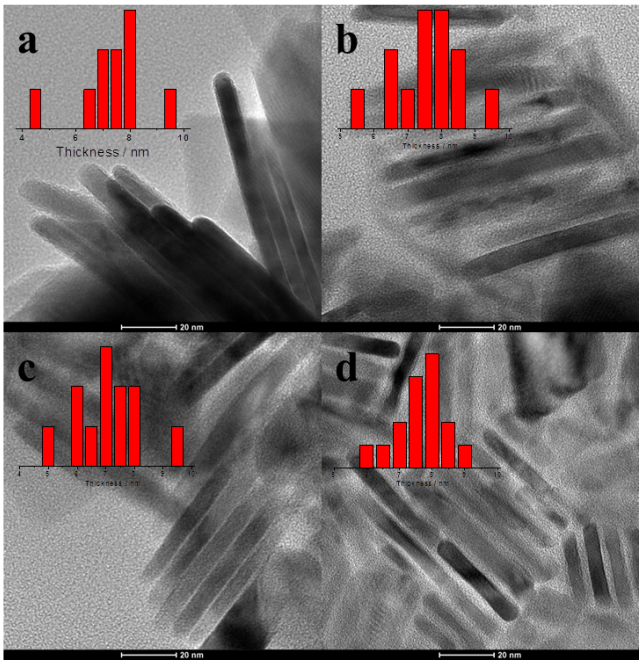

Fig. S8 Size distribution of the Mn_3O_4 nanosheets synthesized from different molar concentration of SA in reaction systems. Inset shows a size comparison of the sheets with different lateral dimensions.