Supporting Information (SI)

Novel Approaches to Synthesize Self-supported Ultrathin Carbon Nanowire Arrays Templated by MCM-41

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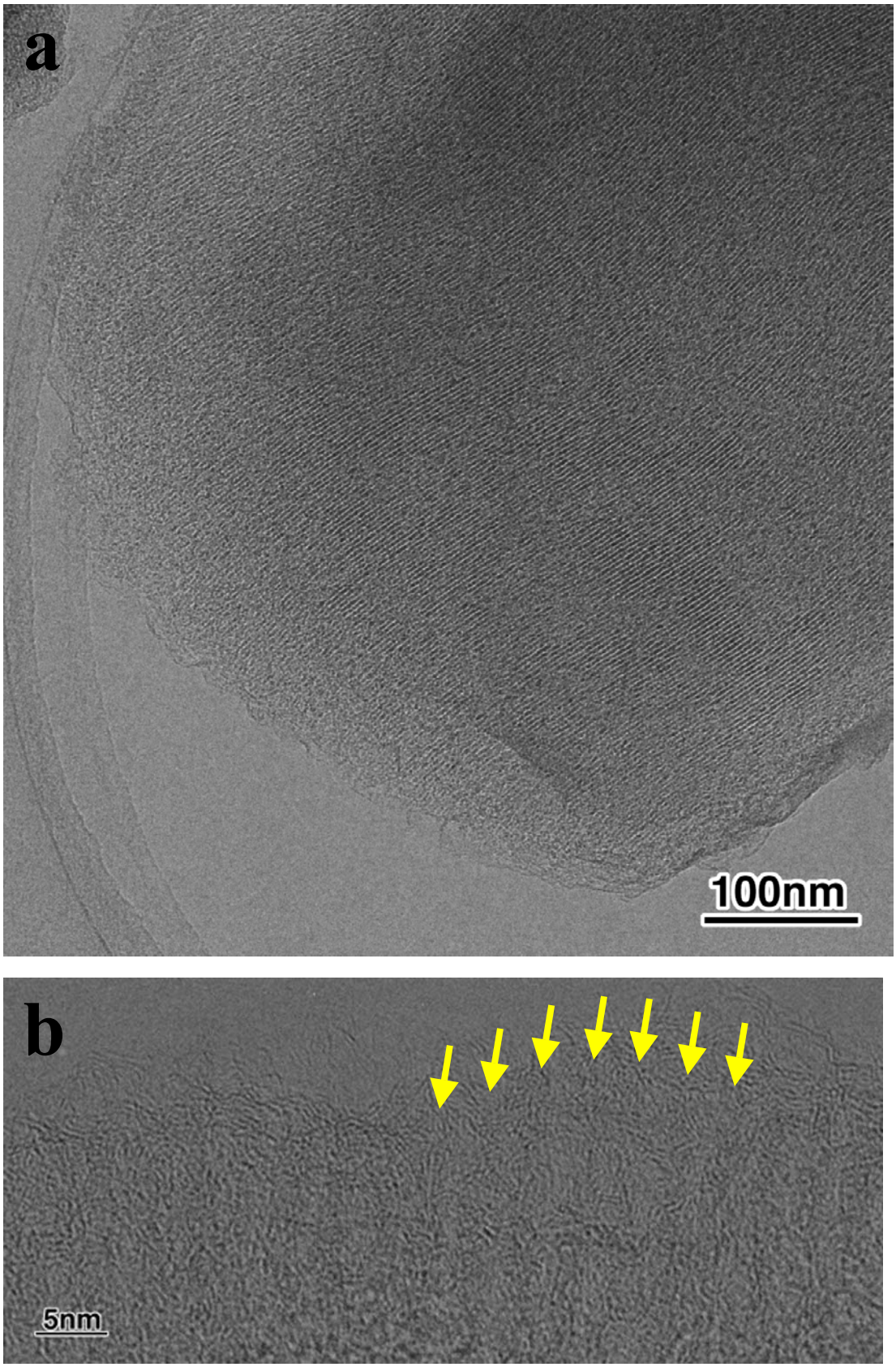
1, Synthesis of as-made conventional MCM-41.

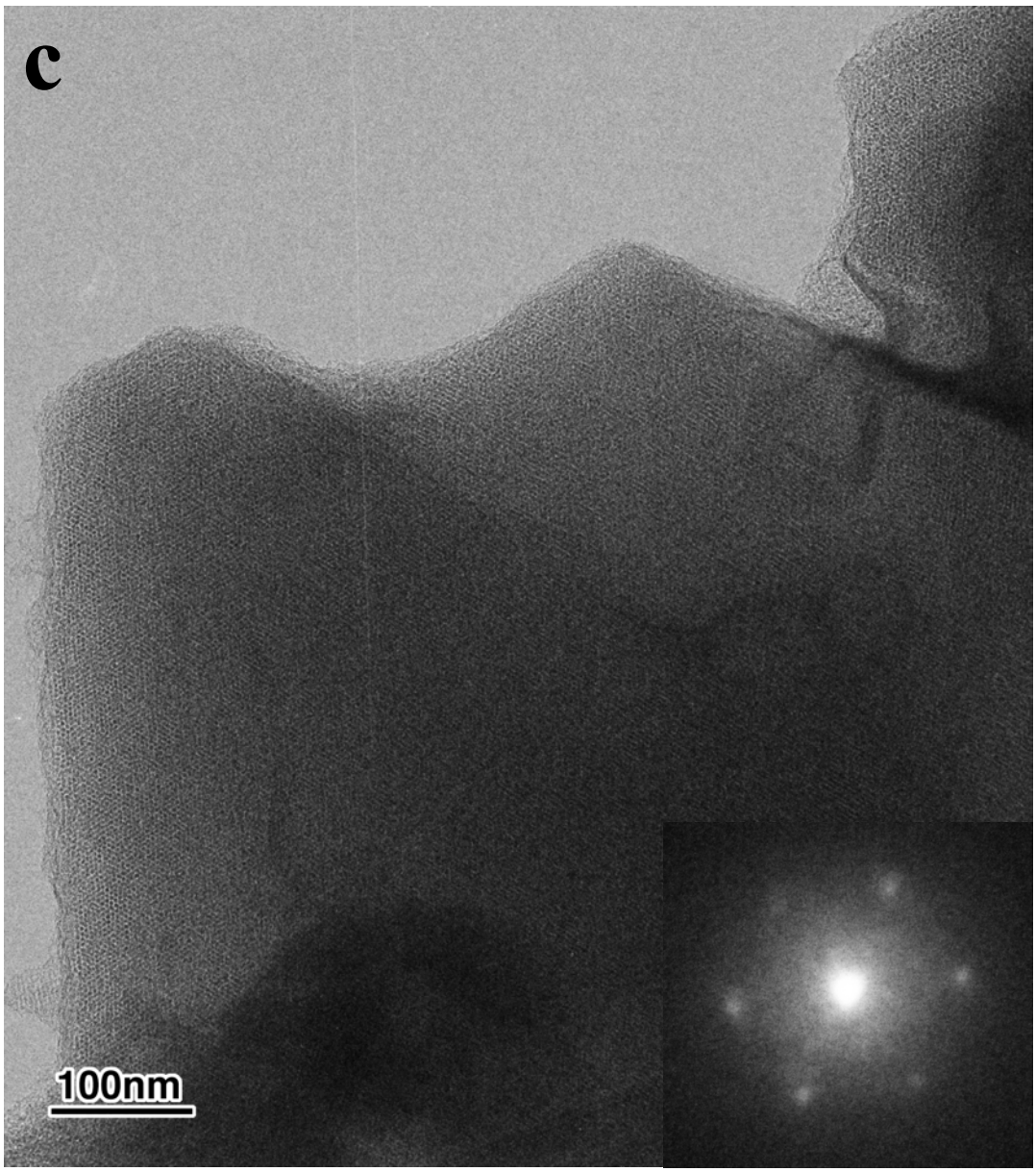
The gel composition is, expressed as mass ratios, 0.4 cetyltrimethylammonium (CTAB); 18 H_2O; 10 concentrated $NH_3 \cdot H_2O$ (28 %); 2.08 TEOS. The slurry was stirred at ambient temperature for 1d and hydrothermally treated at 80 ^oC for 2d. The product was filtered off, dried at 80 ^oC for 10 h.

2, Microwave Digestion (MWD)

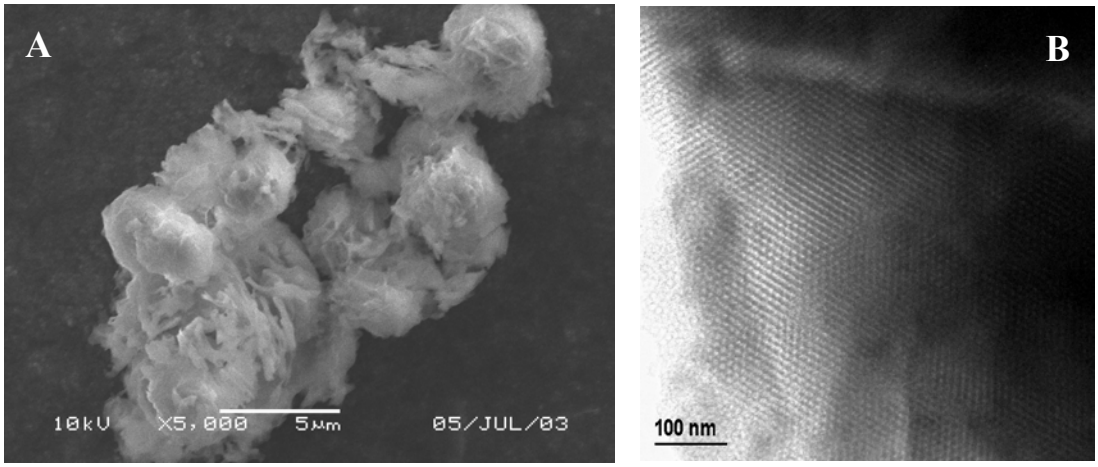
Microwave digestion of the samples was done with a microwave preparation system model MK-Ⅲ for 10 min. The system was equipped with Teflon sample vessels which were transparent for microwave energy, operated at approximately 1200 W. The working frequency was 2450 MHz and the working voltage was 220 V. The sample amount was approximately 0.5 ～ 0.6 g with 4 ml of 15 M HNO_3 and 2 ml of concentrated H_2O_2 (30 wt%) as a solvent. The digested samples were then washed with distilled water and ethanol for several times followed by air drying at ambient temperature. The digestion was conducted at 10 atm for 20 min or at 20 atm for 10 min.

3, TEM images of carbon nanowire arrays (C1) templated by microwave digested MCM-41, viewed a) along and c) perpendicular to c direction. b) is the HRTEM image of the carbon nanowire arrays. The carbon nanowires are marked by arrows in b).

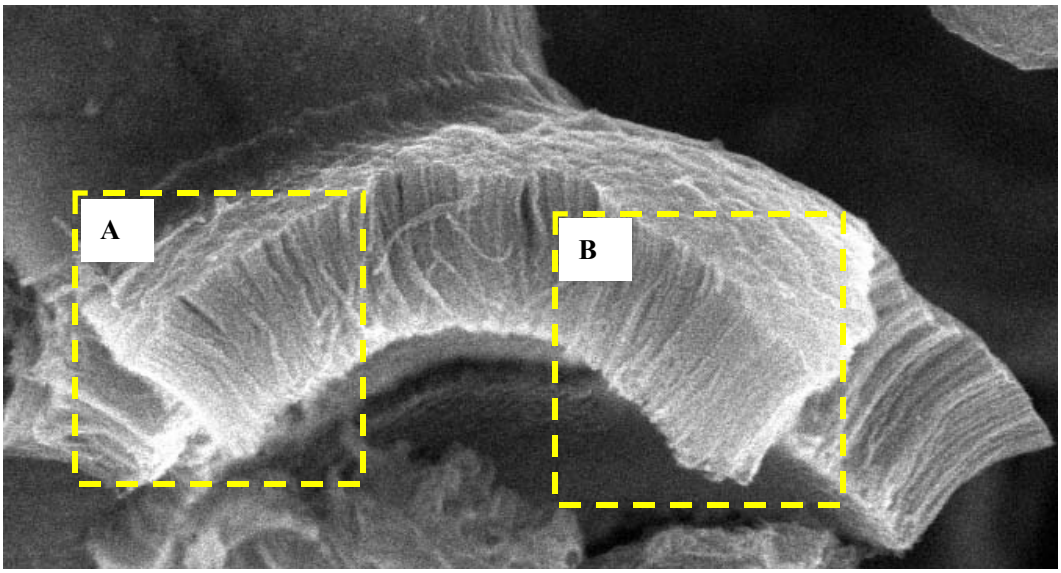


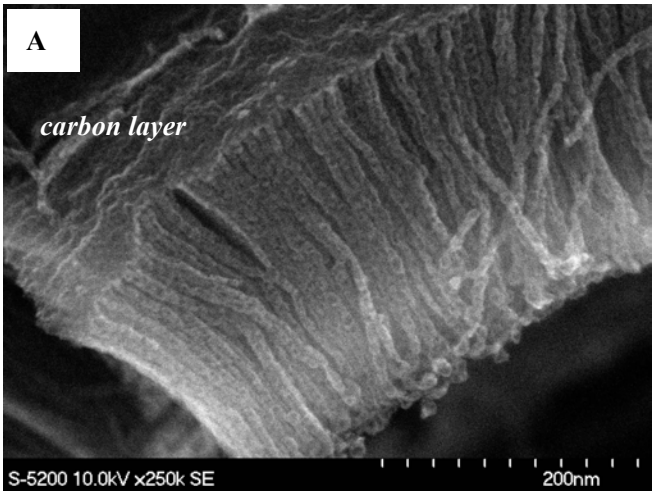

c
100nm

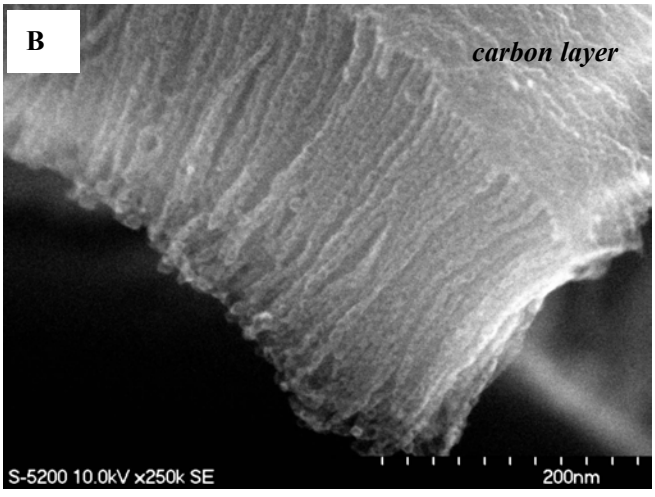
4, SEM (A) and TEM (B) images of leaf-like MCM-41.



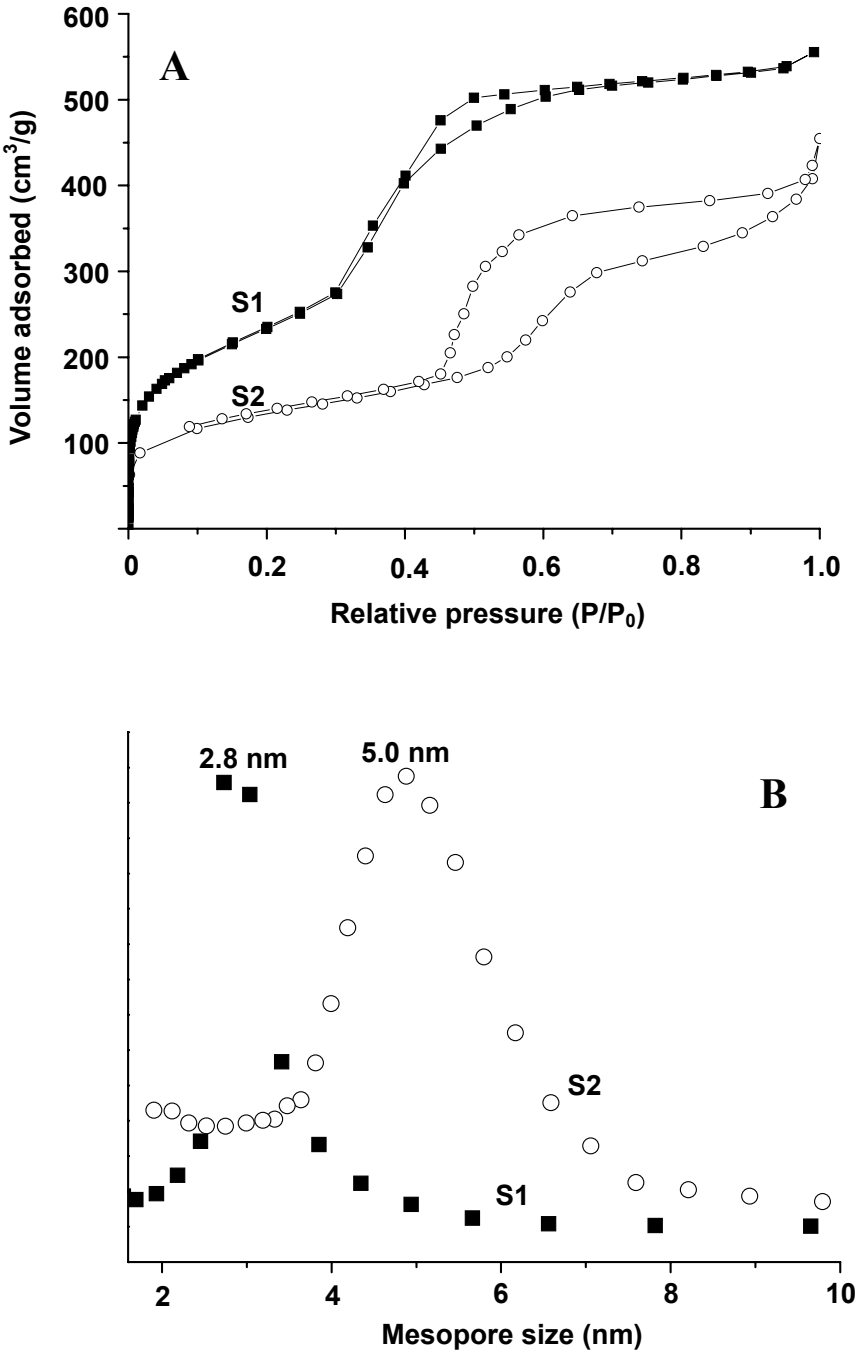
5, FESEM images of carbon nanowire arrays templated by leaf-like MCM-41. Carbon nanotubes can also be observed. It can be observed that the ends of carbon nanowires are covered by thin carbon layers (see enlarged A and B).



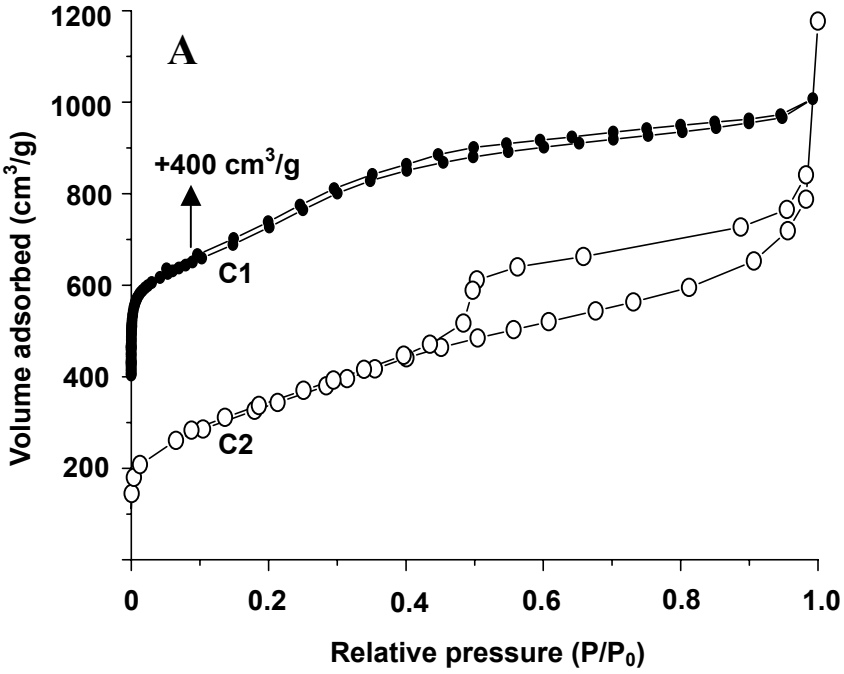


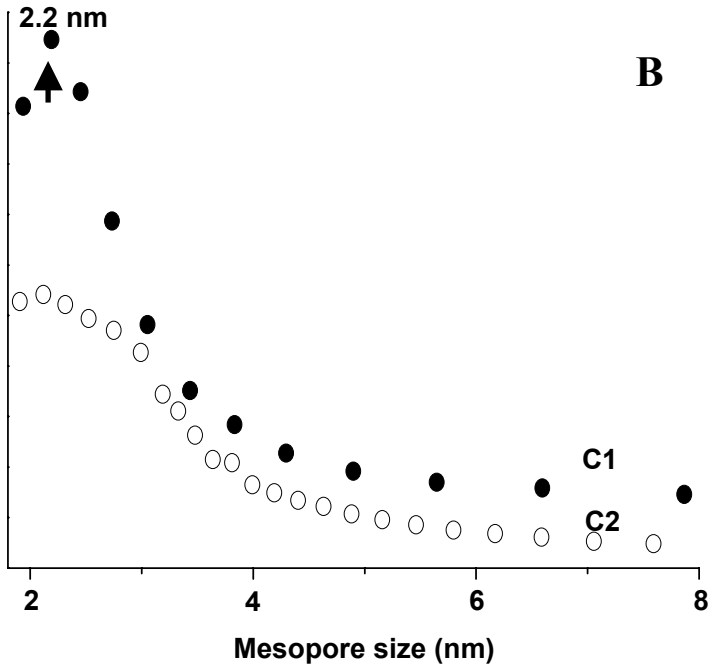


6, N_2 sorption curves (A) and pore size distributions (B) of S1 (MWD-MCM-41) and S2 (leaf-like MCM-41).



7, N_2 sorption curves (A) and pore size distributions (B) of C1 (templated by MWD-MCM-41) and C2 (templated by leaf-like MCM-41).





8, Schematic diagram of two novel preparation procedures for the carbon arrays templated by MCM-41.

A1, microwave digestion; A2, impregnation, carbonization and silica etching; B1, calcination; B2, impregnation, carbonization and silica etching.