Supporting Information

Self-assembly of folic acid/melamine complexes with hierarchy levels: from membranes to porous spherulites and networks

Pengyao Xing[a], Xiaoxiao Chu[a], Mingfang Ma[a], Shangyang Li[a], Yimeng Zhang[a] and Aiyou Hao*[a]

[a]*School of Chemistry and Chemical Engineering and Key Laboratory of Colloid and Interface Chemistry of Ministry of Education, Shandong University, Jinan 250100, PR China.*

Experimental Section

Materials

Folic acid and melamine were purchased from Aladdin Chemical Reagent Co. Ltd, Shanghai, China. All the other reagents were of AR grade and were purchased from Country Medicine Reagent Co. Ltd., Shanghai, China. All the reagents were used without further purification.

Preparation of the aggregates

A solution was obtained by adding certain amounts of folic acid and melamine into water, and heated into a transparent solution. Then the solutions were cooled at ambient temperatures to obtain the aggregates. All the samples for further

* Fax: +86 531 88564464; Tel: +86 531 88363306; E-mail: haoay@sdu.edu.cn.

characterization were deposited at least three days.

Characterization

The samples for Transmission Electron Microscopy (TEM) were prepared by the uranyl acetate staining technique and measured on a JEM-1011 electron microscope (100 kV). Field-emission scanning electronic microscopy (SEM, ZEISS SUPRA 55) was used to study the microstructure of the gel. Before SEM observation, all the samples were dried in vacuum desiccators for 12h to remove the solvent. Then the obtained xerogel was mounted onto a copper disk with a double-sided carbon tape and sprayed with gold on the surface. The textures of spherulites were characterized using an Olympus BX63 polarized optical microscope. The gels were directly tested by a Thermo Scientific HAAKE RheoStress 6000 for rheological studies. The Thermal gravity Analysis (TGA) and Differential Scanning Calorimetry (DSC) thermogram were recorded with the temperature ranging from room temperature to 500 °C at the heating rate of 10 °C/min under a N_2 atmosphere with the reference of empty aluminum. A DSC 822e thermal analysis system from Mettler-Toledo (Swiss) was employed. The samples (about 3 mg) were weighed into unsealed aluminum pans. Fourier Transform Infrared Spectroscopy (FT-IR) measurements were observed by an Avatar 370 FT-IR Spectrometer. KBr was used in the process of sample disks preparation. The FT-IR measurements were carried out at room temperature. For Raman spectra, the GO containing hybrid hydrogel sample was prepared by depositing a thin film on a glass slide and measured by irradiating with laser light at 532 nm in a Horiba Jobin Yvon instrument (LABRAMHR 800). X-ray diffraction

(XRD) experiments were performed on a German Bruker/D8 ADVANCE diffractometer with Cu Ka radiation (λ= 0.15406 nm, 40 KV, 40 mA). Small-angle X-ray scattering (SAXS) measurements were carried out using an in-house set-up with rotating anode X-ray generator (Rigaku RU 300, 12 kW) equipped with two laterally graded multilayer optics in a side-by-side arrangement, giving a highly focused parallel beam of monochromatic Cu Kα radiation (λ= 0.154 nm). UV-vis spectra were recorded at room temperature with a TU-1800pc UV-vis spectrophotometer. ^{1}H NMR spectra were measured on a Bruker AM-300 spectrometer at room temperature with D_2O as the solvent and TMS as the reference. AFM images were recorded under ambient conditions by using a VeecoNanoscope Multimode III SPM, and operated in tapping contact mode.

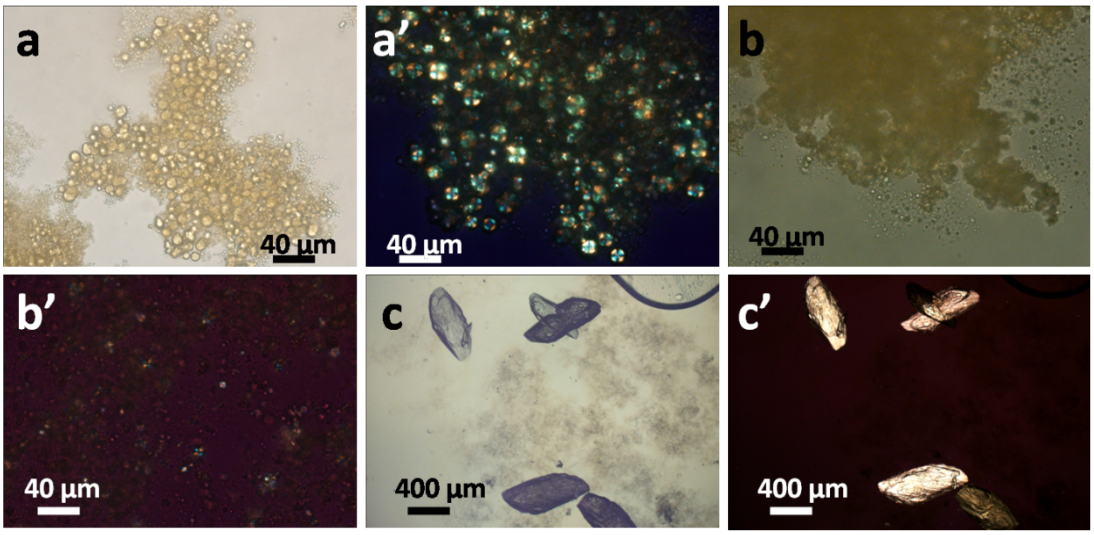

Figure S1. Optical microscopy images of spherulites in gel networks (a-b') and crystals under natural and polarized light.

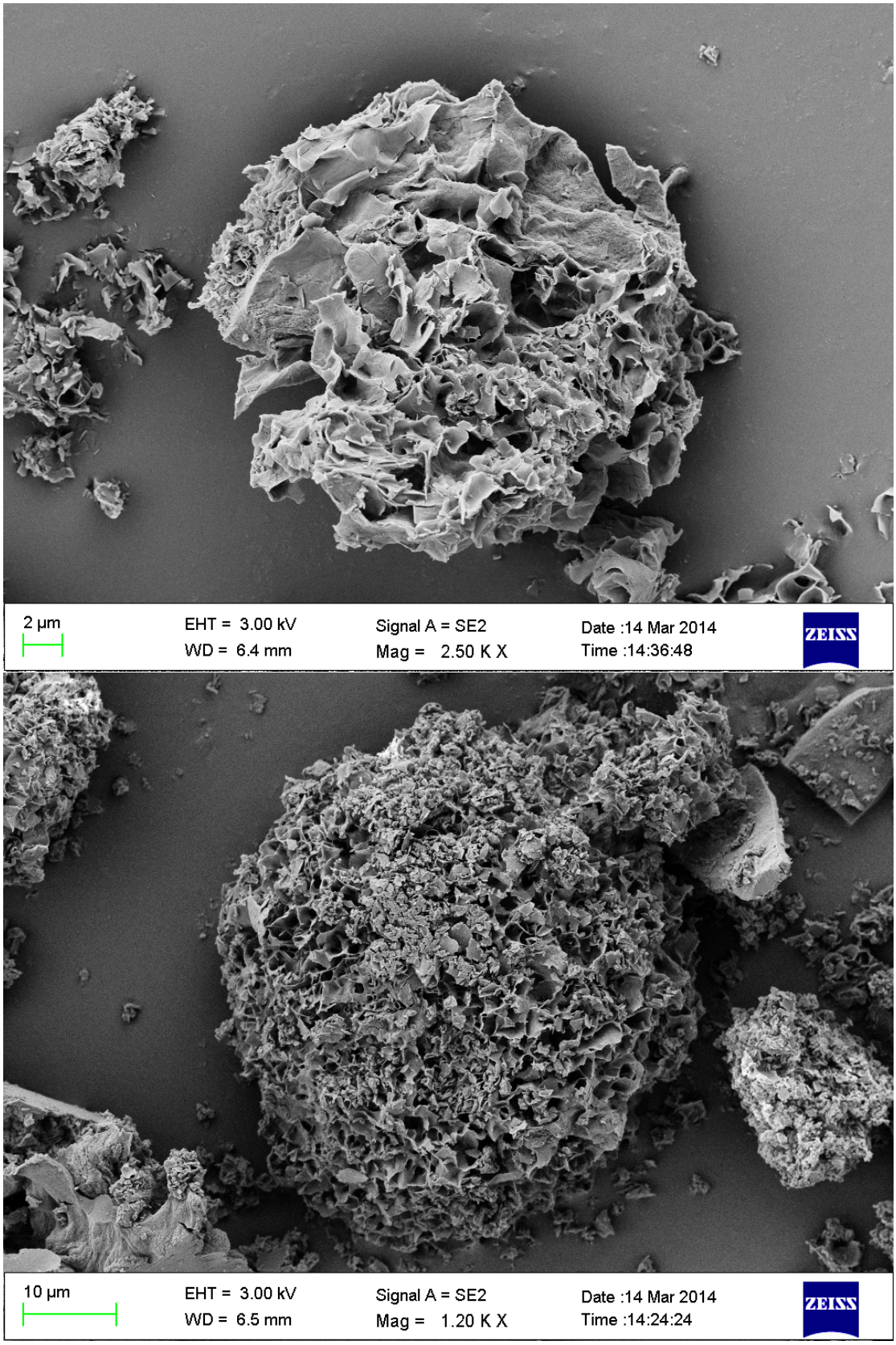

Figure S2. SEM images of spherulites.

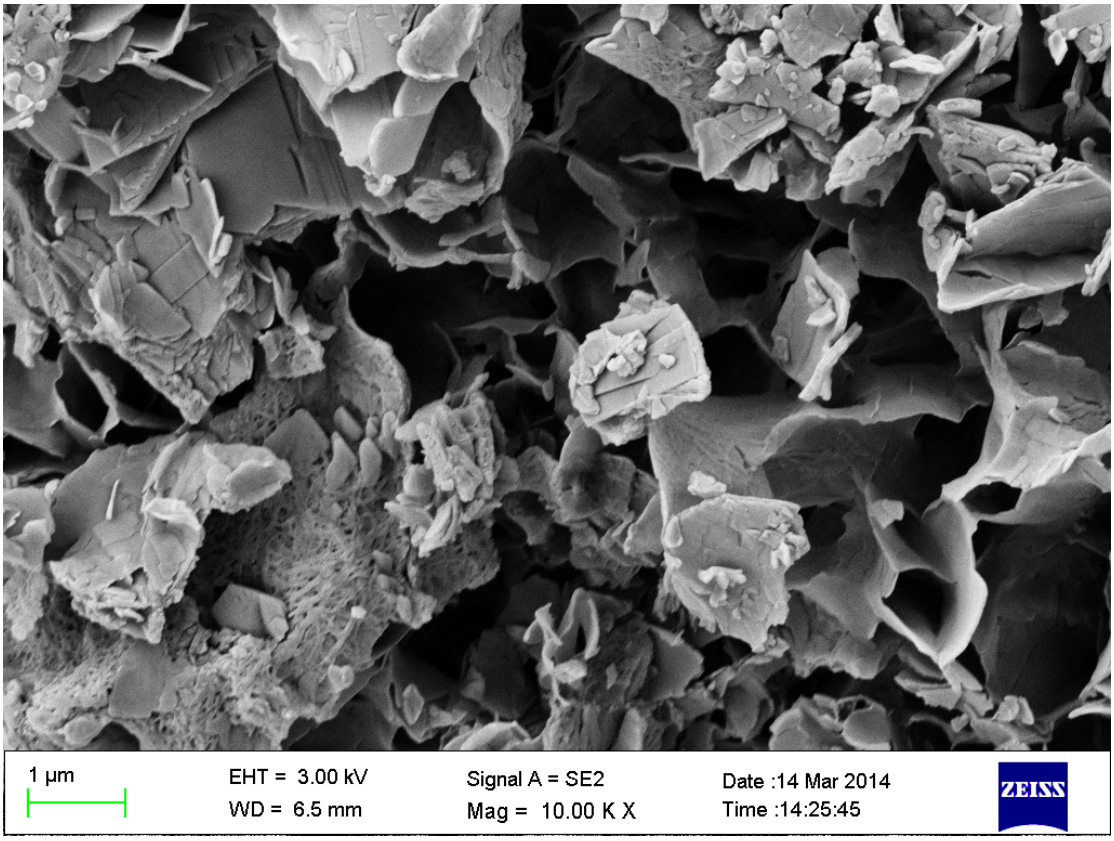

Figure S3. Enlarged SEM picture of the surface of spherulite including fibrous and plate-like aggregates.

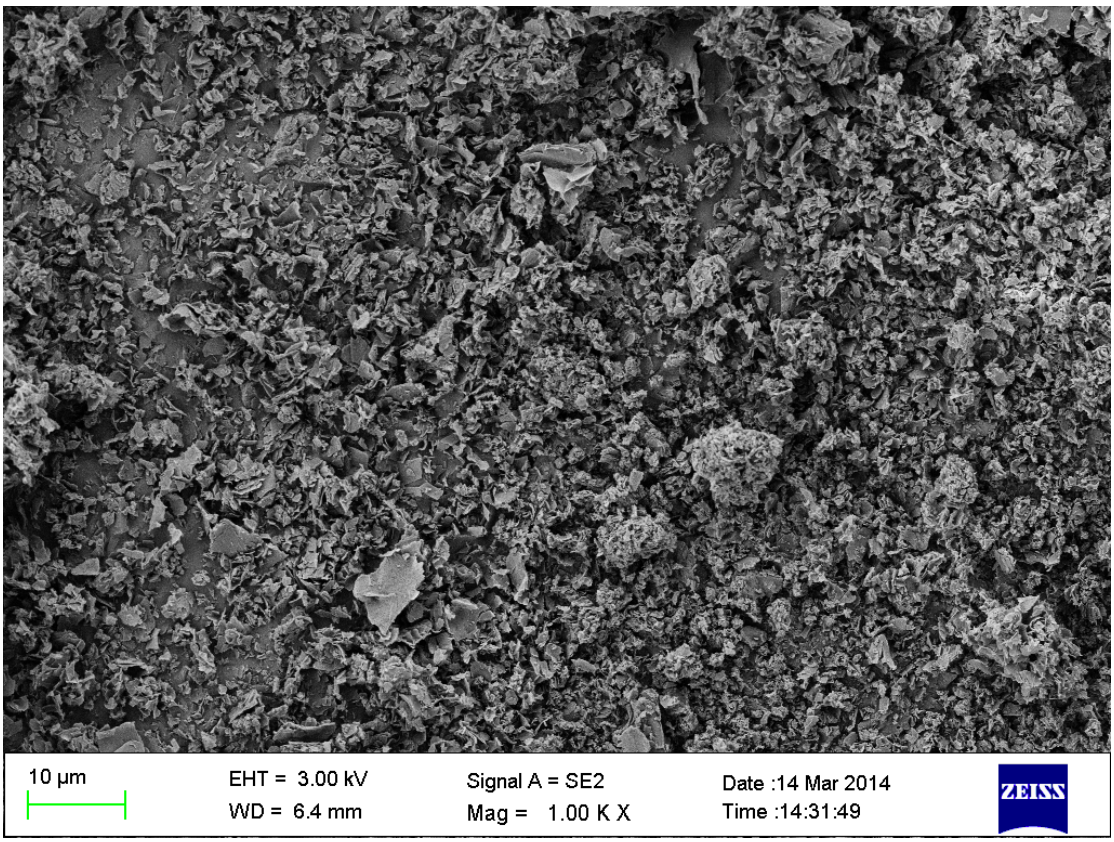

Figure S4. SEM image of the gel network. We could see the scattered microsheets and spherulites.

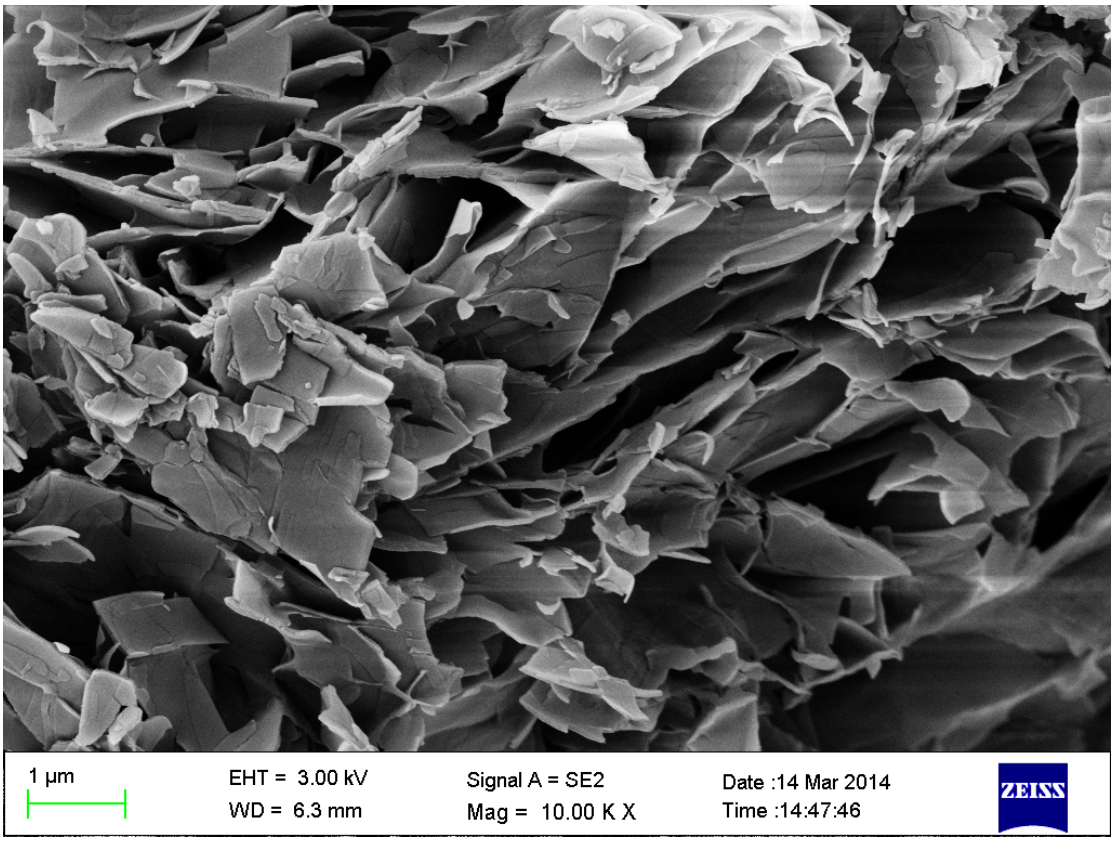

Figure S5. Enlarged SEM picture of gel networks.

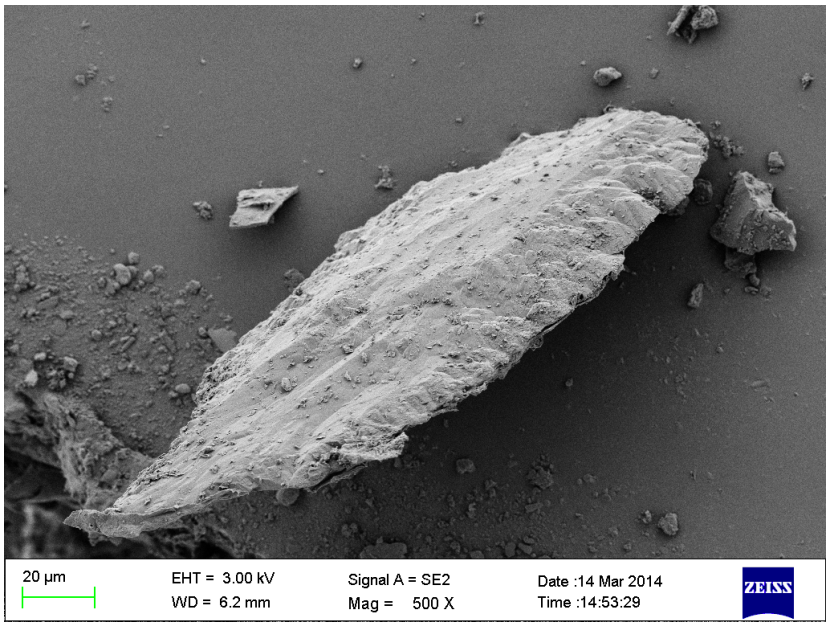

Figure 6. SEM image of a Mm crystal.

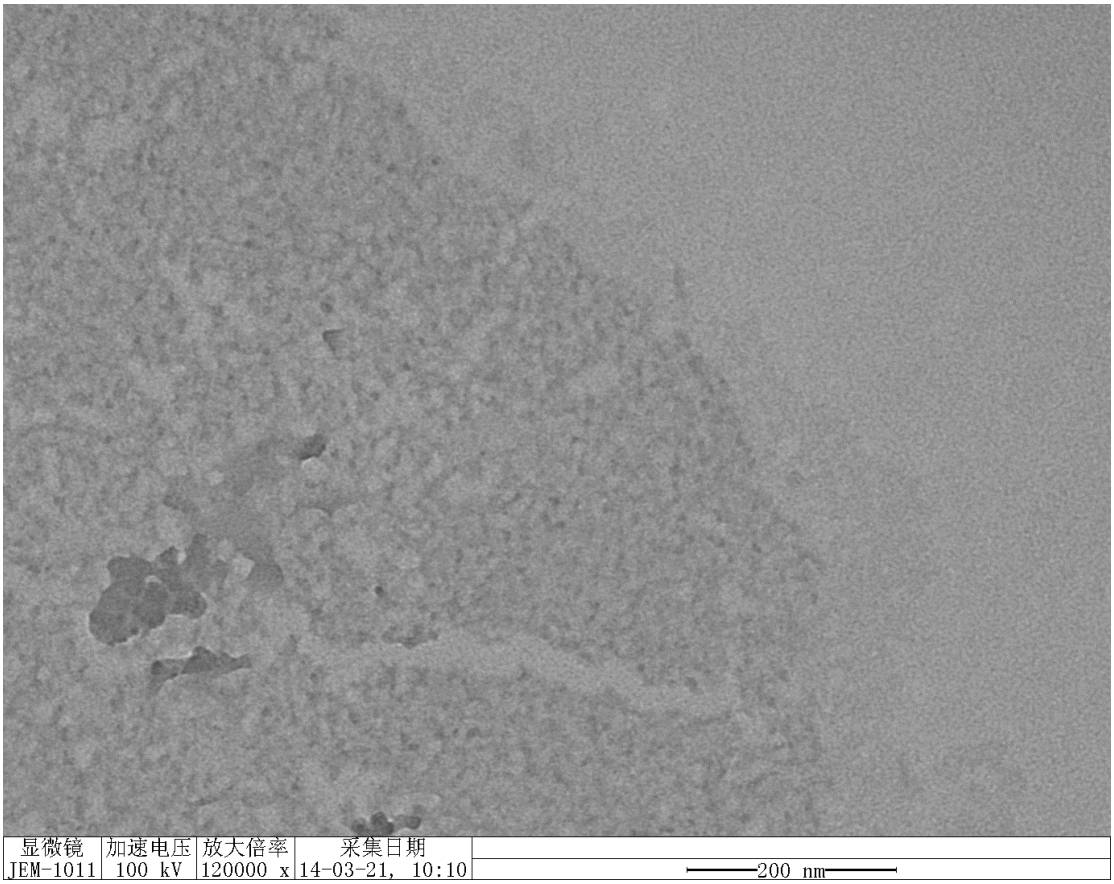

Figure 7. Enlarged TEM images of membrane.

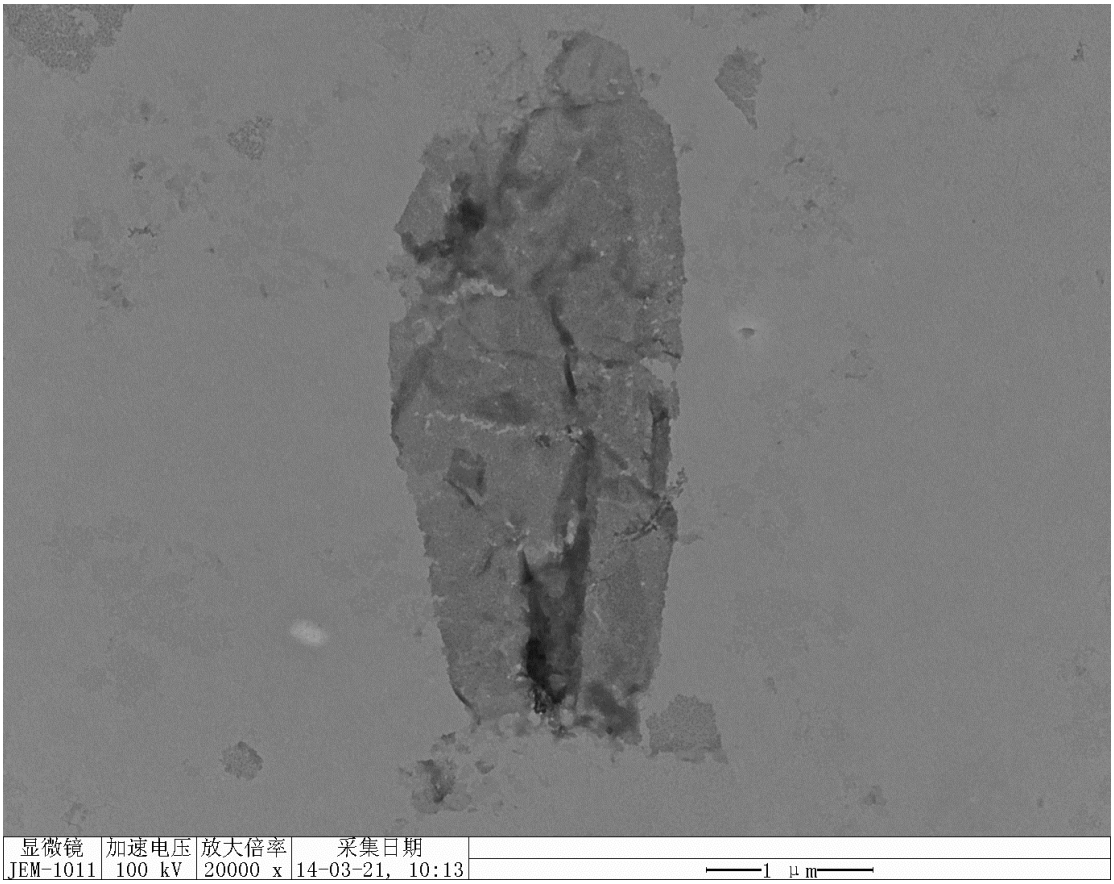

Figure 8. TEM images of folded and overlapped membrane.

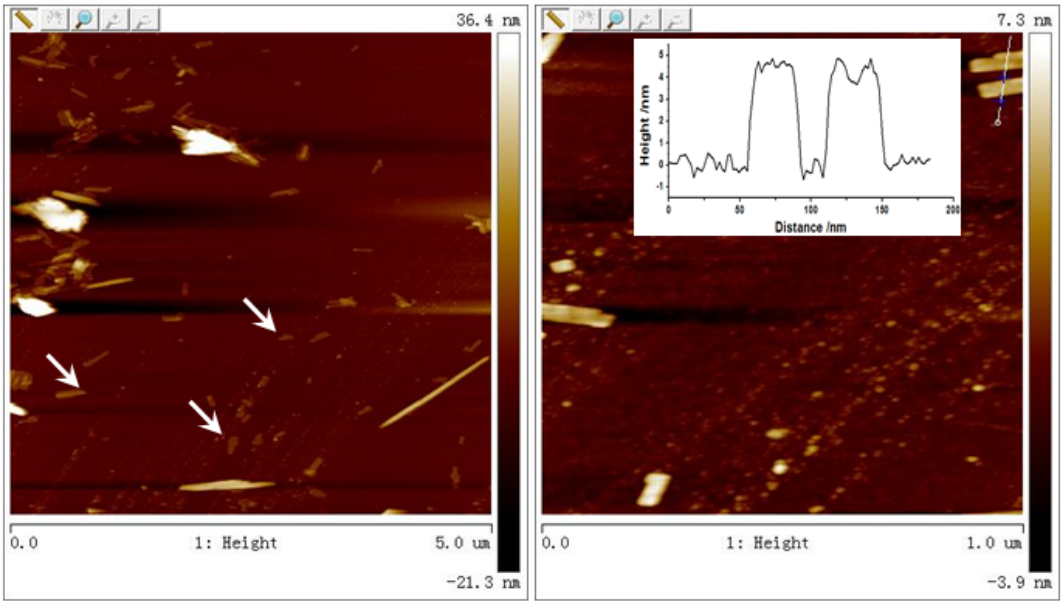

Figure 9. AFM images and cross-section profile of the sample from the supernate (2 mM 1:3).