

1 **Electronic Supporting Information**

2 Synthesis of Ultrafine Polymer Nanofibers

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## 20 **Experimental**

### 21 **Materials**

22 Divinyl benzene (DVB) and Boron trifluoride diethyl etherate (BFEE) is purchased  
23 from Sigma-Aldrich. *n*-hexane and ethanol are purchased from Sinopharm Chemical  
24 Reagent Beijing. All chemicals are analytical grade. DVB is purified over Al<sub>2</sub>O<sub>3</sub>  
25 column to remove impurities and stored at below 0 °C before use.

### 26 **Synthesis of Oleic Acid Capped Fe<sub>3</sub>O<sub>4</sub> NP.**

27 The mixture of 100.0 mL of iron chloride aqueous solution (0.2 M) and 100.0 mL of  
28 sodium oleate aqueous solution (0.2 M) is prepared. The formed iron oleate complex  
29 precipitate is filtered and washed with distilled water, then dried to remove water. The  
30 complex is dispersed into a solution containing 20.0 mL of ethanol and 2.0 mL of  
31 oleic acid. The mixture solution is putted in a Teflon-lined stainless steel autoclave  
32 and heated to 180 °C for 5 h. When cooling down, the obtained Fe<sub>3</sub>O<sub>4</sub> NPs is  
33 absorbed with a magnet and washed with some ethanol. At last, the Fe<sub>3</sub>O<sub>4</sub> NPs is re-  
34 dispersed in *n*-hexane .

### 35 **Preparation of ultrafine PDVB nanofibers composites**

36 A solution of the oleic acid capped Fe<sub>3</sub>O<sub>4</sub> NPs (0.05 wt %) in *n*-hexane is prepared.  
37 Then BFEE (0.05 wt %) and DVB (2 wt %) is added in order under ultrasound at  
38 room temperature. The dispersion becomes turbid progressively, and the brown  
39 PDVB ultrafine nanofibers composite precipitated eventually. In order to monitor  
40 growth of the nanofibers, ethanol is added to terminate the polymerization at different  
41 stage. The PDVB ultrafine nanofibers composites are separated by centrifugation and

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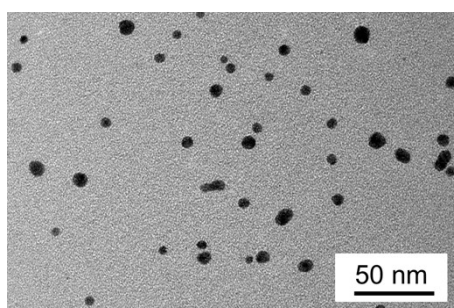
42 washed with ethanol.

43 **Preparation of purified ultrafine PDVB nanofibers through ultrasonic disruption**  
44 **and magnetic separation**

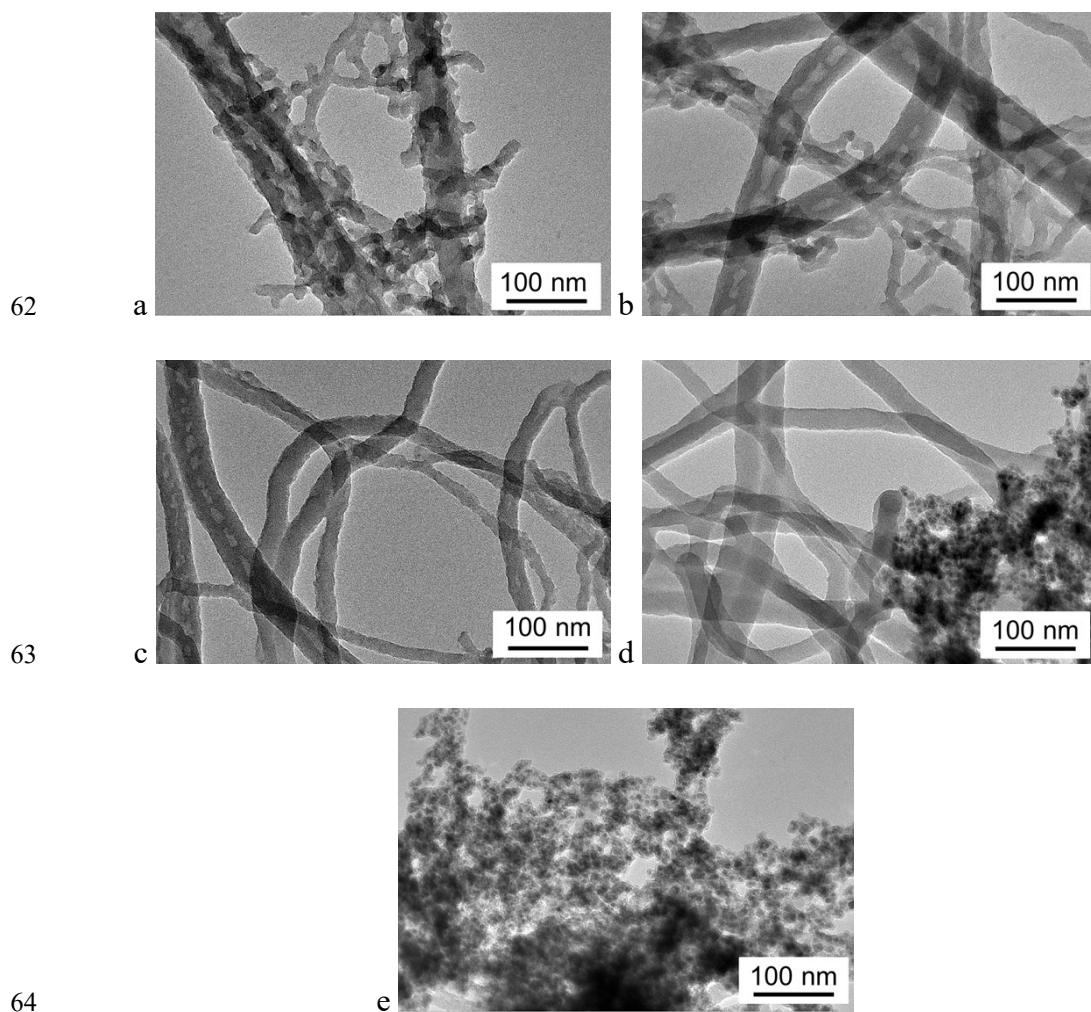
45 The ultrafine PDVB nanofibers composites are dispersed in ethanol at a concentration  
46 of 0.002 g/ml. a sonicator probe horn is fitted into the sample tube with its tip dipped  
47 into the solvent. The sonicator probe horn (with a 6 mm diameter tip) was connected  
48 to an ultrasonic cell disruptor (model JY96- II , sonic power ~150 W, Scientz, Ningbo,  
49 China) having a frequency of 20 kHz. A bar Neodymium magnet is attached along the  
50 outside of the tube wall during the entire ultrasonic process and the sample tube with  
51 the magnet is placed in an ice-water bath. The sample solvent is performed under  
52 ultrasonic crushing for tens of minutes.

53 **Characterization**

54 The morphology of the PDVB ultrafine nanofiber composites is characterized using  
55 Scanning electron microscopy (SEM, S-4800 at 15 kV) and transmission electron  
56 microscopy (TEM, JEOL 100CX operating at 100 kV). The samples are sputtered  
57 with Pt in vacuum for SEM observation. The samples are prepared onto carbon-  
58 coated copper grids for TEM observation.



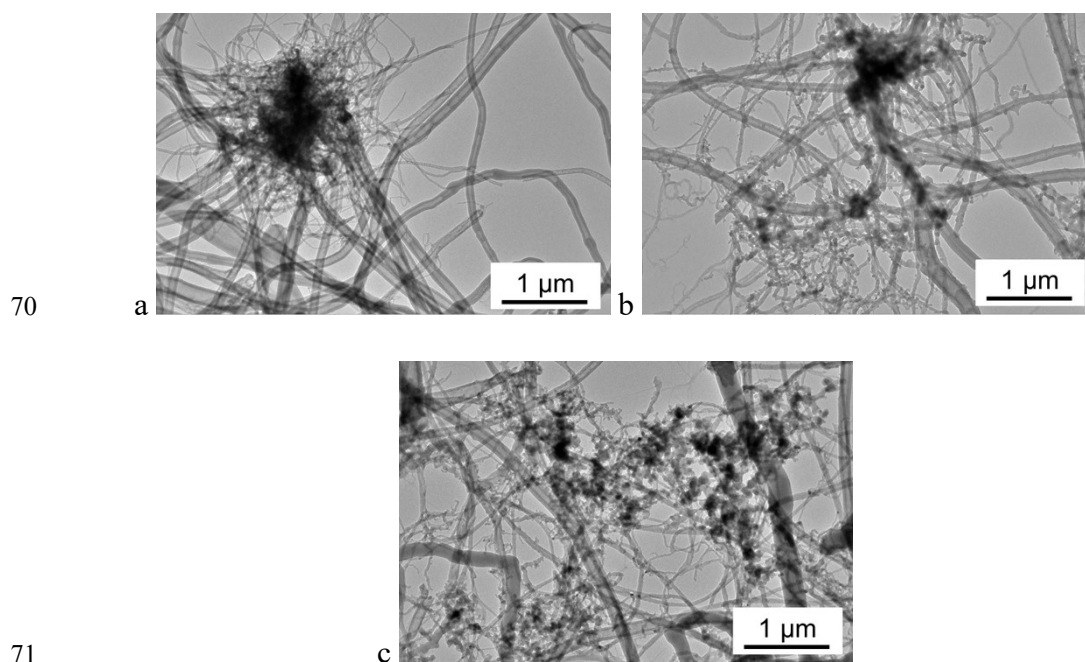
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60 **Figure S1.** TEM images of the oleic acid capped Fe<sub>3</sub>O<sub>4</sub> NPs. The size of the Fe<sub>3</sub>O<sub>4</sub>  
61 NP is about 10 nm.



65 **Figure S2.** TEM images of PDVB nanofibers synthesized at different concentration  
66 of  $\text{Fe}_3\text{O}_4$  NPs: (a) 0.005 wt %; (b) 0.01 wt %; (c) 0.02 wt %; (d) 0.05 wt %; (e) 0.2 wt  
67 %. DVB and BFEE are fixed at 2 wt % and 0.05 wt %.

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72 **Figure S3.** TEM images of PDVB nanofibers synthesized at different concentration  
73 of Fe<sub>3</sub>O<sub>4</sub> NPs: (a) 0.005 wt %; (b) 0.01 wt %; (c) 0.02 wt %. DVB and BFEE are fixed  
74 at 2 wt % and 0.05 wt %.

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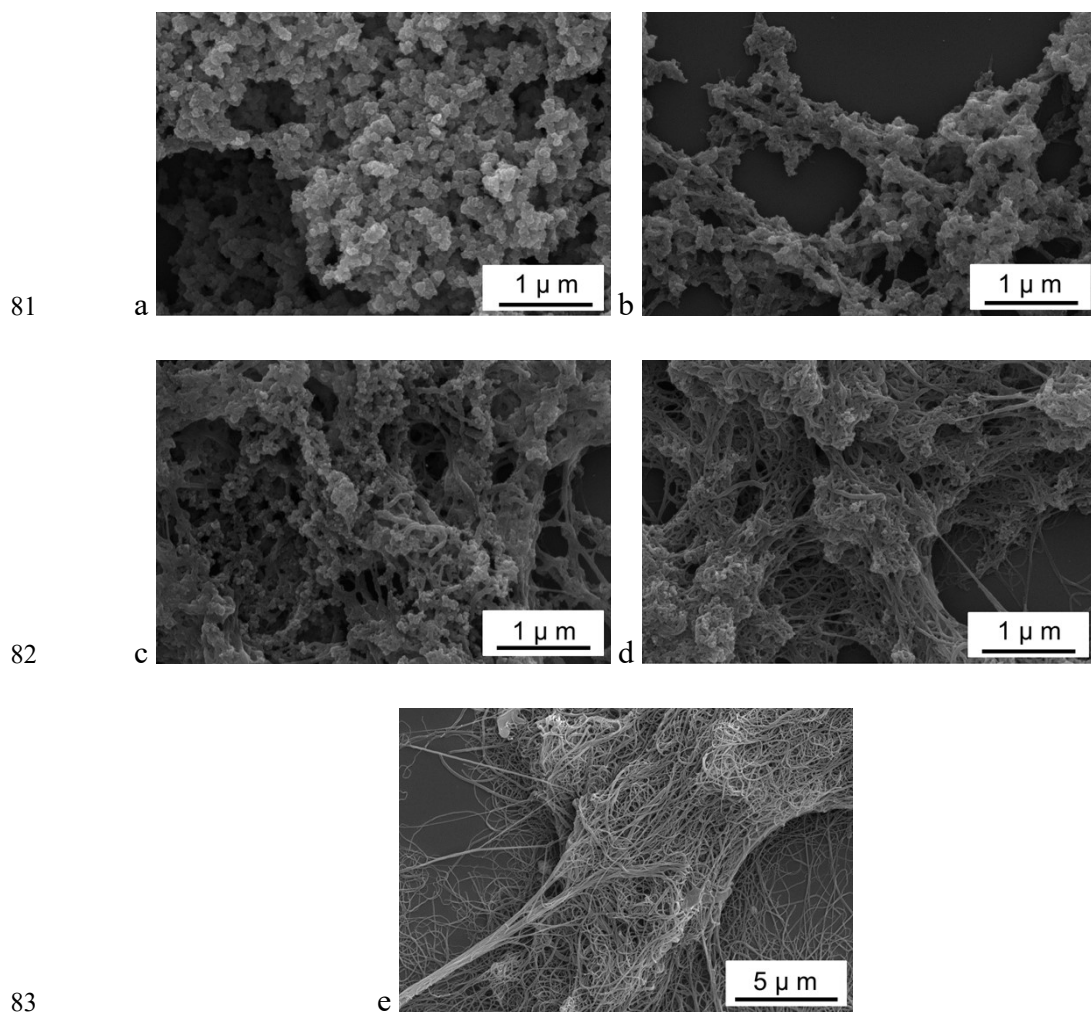
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84 **Figure S4.** SEM of the composites with different polymerization time: (a) 30 s; (b) 1  
85 min; (c) 3 min; (d) 5 min; (e) 20 min. DVB, BFEE and the oleic acid capped  $\text{Fe}_3\text{O}_4$   
86 NPs are fixed at 2 wt %, 0.05 wt % and 0.05 wt %, respectively.