Supporting Information

Fabrication of Electromagnetic Fe3O4@Polyaniline Nanofibers with High Aspect Ratio

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Characterization

Fourier transform infrared spectra (FTIR) were obtained on a Bruker TENSOR 27 spectrometer. X-ray diffraction patterns (XRD) were got on a Shimadzu XRD-7000S diffractometer with $Cu_{k\alpha}$ radiation (λ=1.548Å) from 20° to 80°. X-ray photoelectron spectra (XPS) were gained through a Kratos Axis Ultra DDL spectroscopy.

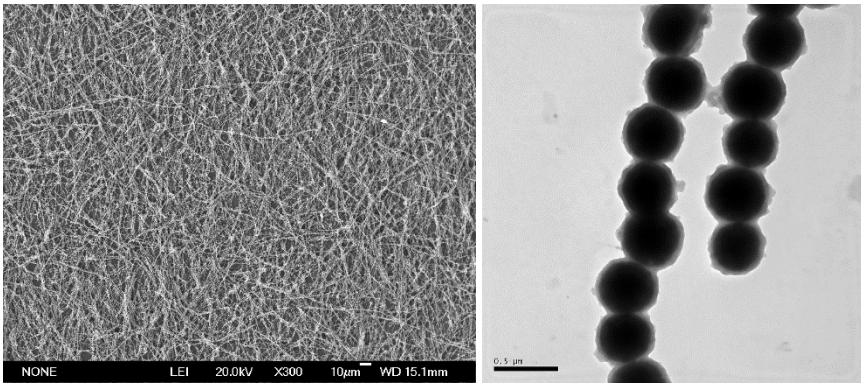

Figure 1. Some representative SEM and TEM images of Fe_3O_4@PANI nanofibers.

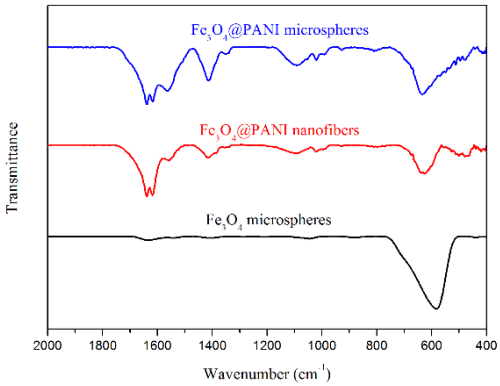

Figure 2. FTIR spectra of Fe_3O_4 microspheres, Fe_3O_4@PANI nanofibers, and Fe_3O_4@PANI microspheres.

FTIR spectra of Fe_3O_4 microsperes, Fe_3O_4@PANI nanofibers, and Fe_3O_4@PANI

microspheres are shown in figure 2. For Fe_3O_4 microspheres, the characteristic absorption peaks present at 590cm^{-1} assigned to Fe-O vibration. For Fe_3O_4@PANI nanofibers and Fe_3O_4@PANI microspheres, the characteristic absorption peaks at 1641, 1621, 1412, 1348, 1095, and 810 cm^{-1} are related to C=C stretching vibration of quinoid rings and benzenoid rings, C-N stretching, C=N stretching, C-H bending in plane and out of plane in the 1,4-substituted phenyl ring, respectively. The relatively high intensity of a band at 635cm^{-1} (Fe-O vibration in Fe_3O_4) in Fe_3O_4@PANI nanofibers and Fe_3O_4@PANI microspheres indicates the PANI coating shell is thin, which demonstrates that the PANI coating shell onto the Fe_3O_4 microspheres are successfully prepared.

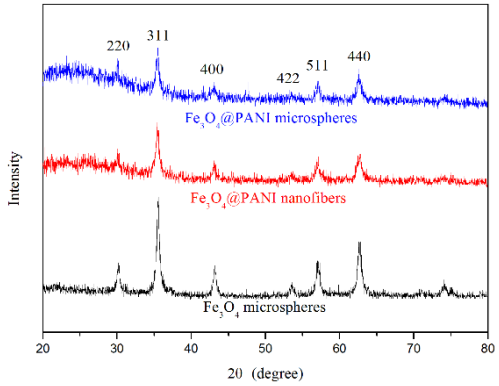

Figure 3. XRD patterns of Fe_3O_4 microspheres, Fe_3O_4@PANI nanofibers, and Fe_3O_4@PANI microspheres.

Figure 3 shows the XRD patterns of the Fe_3O_4 microspheres, Fe_3O_4@PANI nanofibers, and Fe_3O_4@PANI microspheres. All detected diffraction peaks ((220) (311) (400) (422) (511) (440)) can be indexed as face centered cubic Fe_3O_4 (JCPDS Card No. 19-629). For the Fe_3O_4@PANI nanofibers and Fe_3O_4@PANI microspheres, the main peaks of them are the same as those of pristine Fe_3O_4 microspheres, which means that the crystal structure of Fe_3O_4 microspheres is well-maintained even if they experience the coating process in the acidic solution. Besides, a broad diffraction peak is found from 20° to 30°, which are contributed to the amorphous PANI.

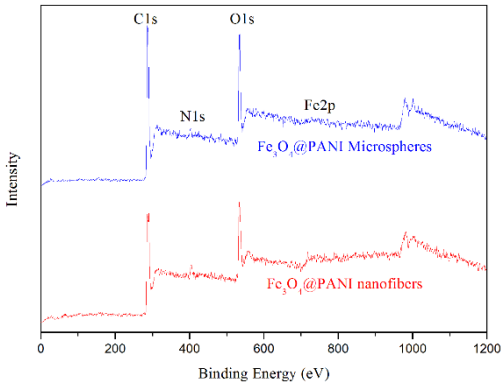

Figure 4. XPS spectra of Fe_3O_4@PANI nanofibers and Fe_3O_4@PANI microspheres.

To further analyze the Fe_3O_4@PANI nanofibers and Fe_3O_4@PANI microspheres, XPS spectra was employed to understand the composition of their surface. In figure 4, for Fe_3O_4@PANI nanofibers and Fe_3O_4@PANI microspheres, it is clear that the main content of their surface is C, O, N elements. The binding energy of Fe2p is not obvious, which further supports that the Fe_3O_4 microspheres are confined within a shell of PANI coating shell, in accordance with the TEM images.