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A Facile Route to Synthesis the h-BN-FeB_{49} Nanocomposites with Magnetic and Fluorescent properties

*Lianping Zhang, Guo Zhang,Chunsheng Chen, Li Li, Tingliang Xia ,Keying Shi**

Key Laboratory of Functional Inorganic Material Chemistry, Ministry of Education. Key Laboratory of Physical Chemistry, School of Chemistry and Chemical Engineering, Heilongjiang University, Harbin 150080, People's Republic of China

*Corresponding authot. Tel.: +86 451 86609141; +86 451 86609141
E-mail address: shikeying2008@yahoo.cn (K. Y. Shi).

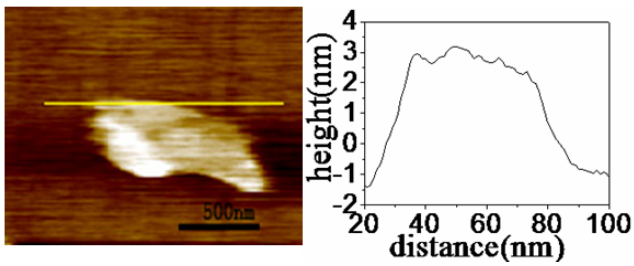

Fig. S1 The AFM image of h-BN sheet peeled off from the BN-FeB-5 by N,N-Dimethylformamide (DMF)

The AFM image of thin h-BN nanosheets with a smaller thickness of about 3-4 nm is shown in fig. S1.

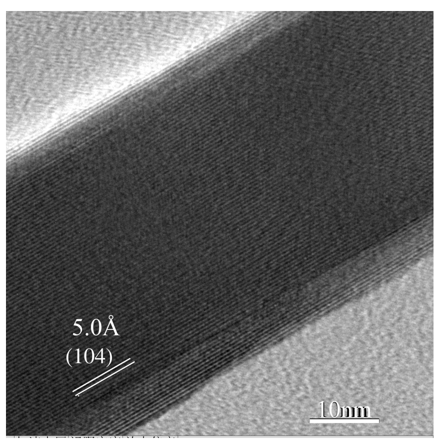

Fig. S2 TEM image of pure FeB_{49} nanorod obtained with the same condition of the BN-FeB-10 without NH_3

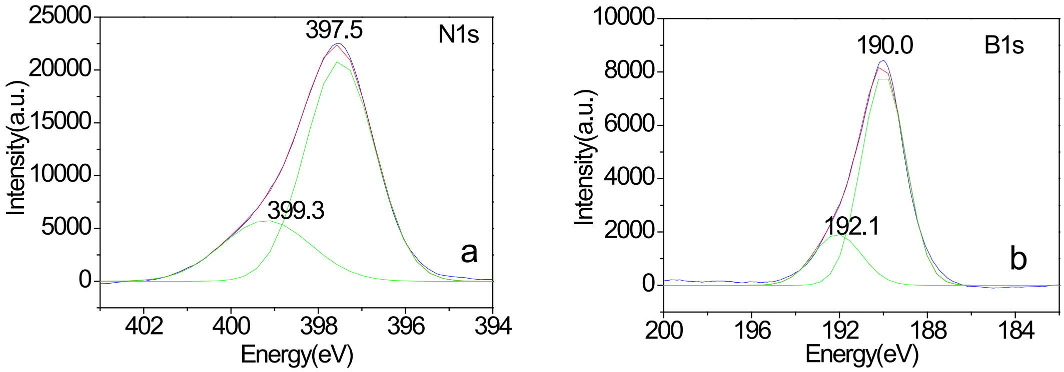

Fig. S3 XPS spectra of BNNTs (a) N1s of BNNTs, (b) B1s of BNNTs

The binding energies of N1s and B1s are shown in Fig. S3 (a, b).Two main peaks of N1s with binding energies of 397.5 and 399.3 eV are shown in Fig. S3 (a). the peak at 397.5eV and the peak at 190.0eV corresponds to nitrogen bonded to boron (N-B bond)**.** The little peak of B1s (192.1Ev) is consistent with the B-O bond of the B_2O_3 and the little peak (399.3eV) of N1s is attributed NH_2.

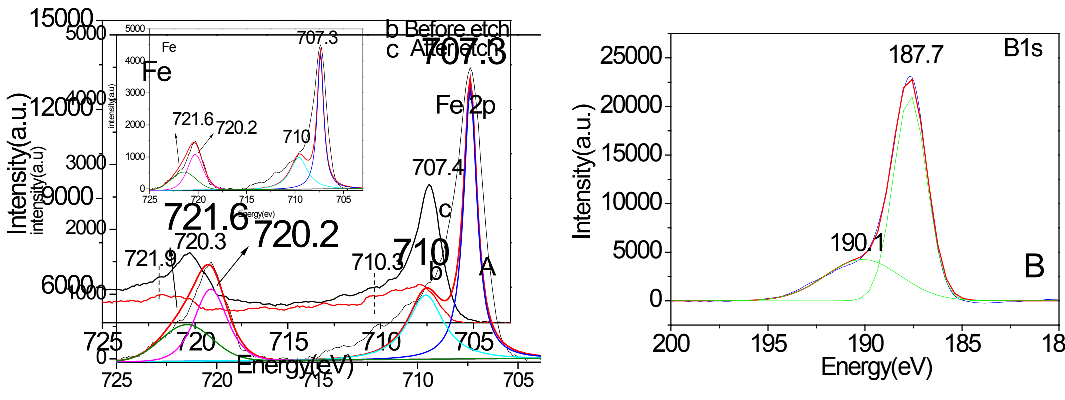

Fig. S4 XPS spectra of FeB_{49} before and after etch

(a) Fe2p, the inset showing the peaks separated by Gaussian fitting (b) B1s

The XPS spectra of FeB_{49} are shows in Fig.S4 (AB). Compared with the binding energies of Fe2p before Ar+ sputtering, two main peaks of iron with binding energies of 707.4 and 720.3 eV (see 4a and 4b curves in Fig.S4 A) are attributed to the Fe 2p3/2 and Fe 2p1/2 levels, which is consistent with the values for pure iron metal. At the same time, others two peaks of iron with binding energies of 710.3 and 721.9 eV are attributed to the Fe^{3+}. It can be seen that more iron metal than the Fe^{3+} after etched ,which means that iron is mainly in its metallic state in the inter of the sample. As shown in the pattern of B1s for FeB_{49} Fig. 4B. In comparison with pure boron (187.3 eV), the standard binding energy of the elemental boron in FeB_{49} (187.7 eV) positively shifted about 0.4 eV, indicating electron transfer from boron to iron. Another little peak maybe B_2O_3 (192 eV) or B-Fe-O bind is formed due to O_2 of the air is absorbed on the FeB_{49} surface.

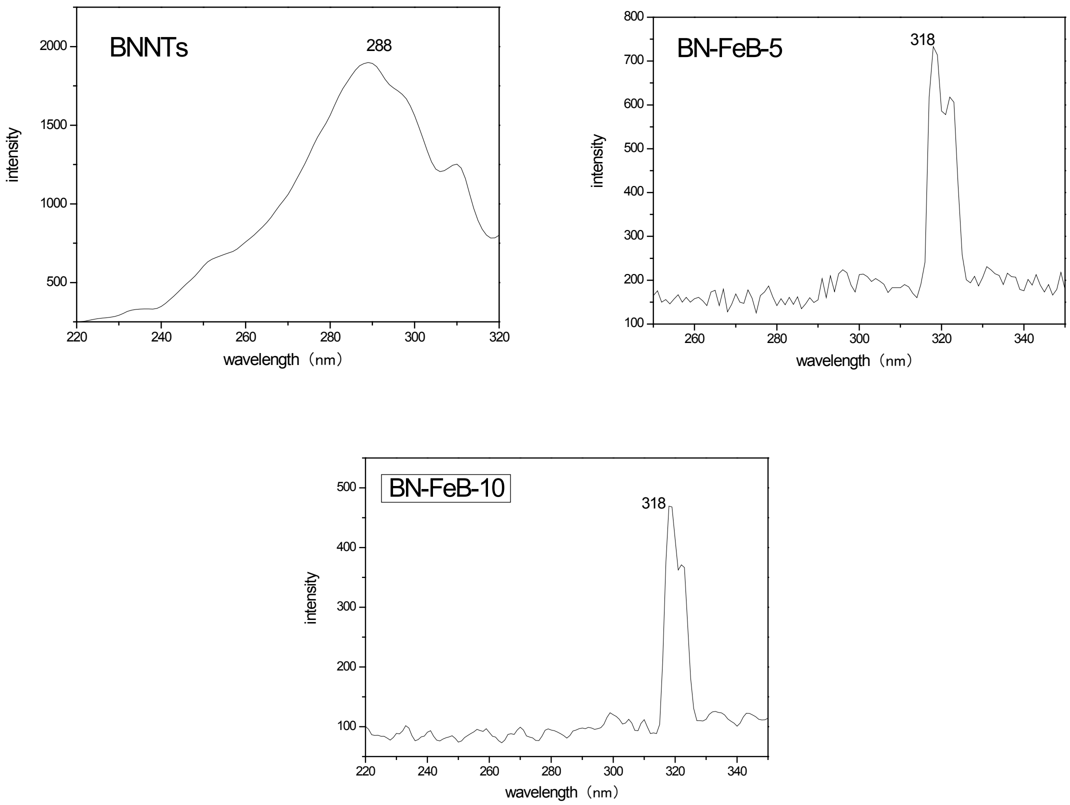

Fig.S5 the excitation spectrum of the samples, BNNTs, BN-FeB-5 and BN-FeB-10.

Table 1 the results of ICP analyses

Samples	Elements	Concentration (mg/L)	Mole ratio
BN-FeB-5	Fe	0.131mg/L	241.8
	B	6.224 mg/L	
FeB_{49}	Fe	0.879 mg/L	62.8
	B	10.85 mg/L	
BN-FeB-10	Fe	0.995 mg/L	120.9
	B	23.63 mg/L	
h-BN	Fe	0	
	B	7.660 mg/L	