Supplementary Information

From ultrathin nanosheets, triangular plates to nanocrystals with exposed (102) facets, a morphology and phase transformation of sp^2 hybrid BN

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SI 1. SEM and TEM images of BNTPs and BNNSs

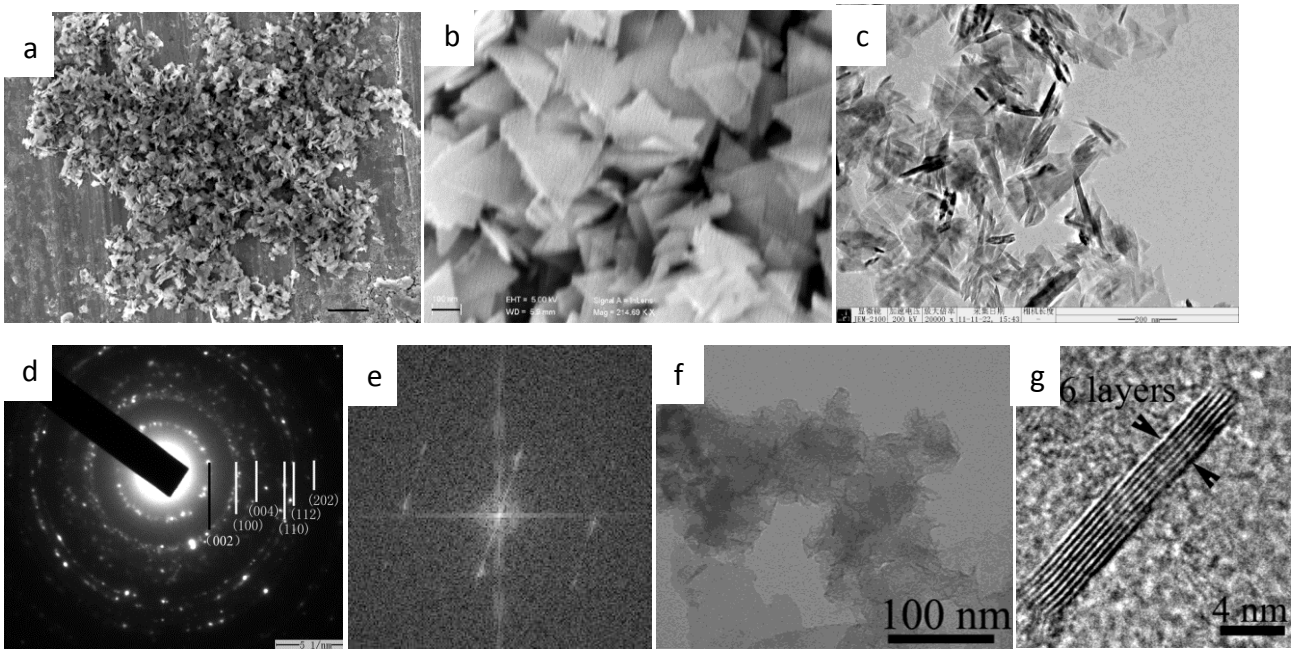

Fig. SI 1. SEM(a,b), TEM (c,f) and HRTEM(g) images of BNTPs(a-e) and BNNSs (f,h), the SEAD pattern (d) corresponds to (c), the pattern was indexed base on the *h*-BN phase, the FFT pattern (e) was got from the HRTEM images in Fig. 3d. The thinness of agglomerated ultrathin BNNSs was mainly in the range of 1~6 nm (f), a typical BNNSs constituted with 6~8 layers (g).

SI 2 Scheme for armchair, zigzag terminated triangular BN monolayers

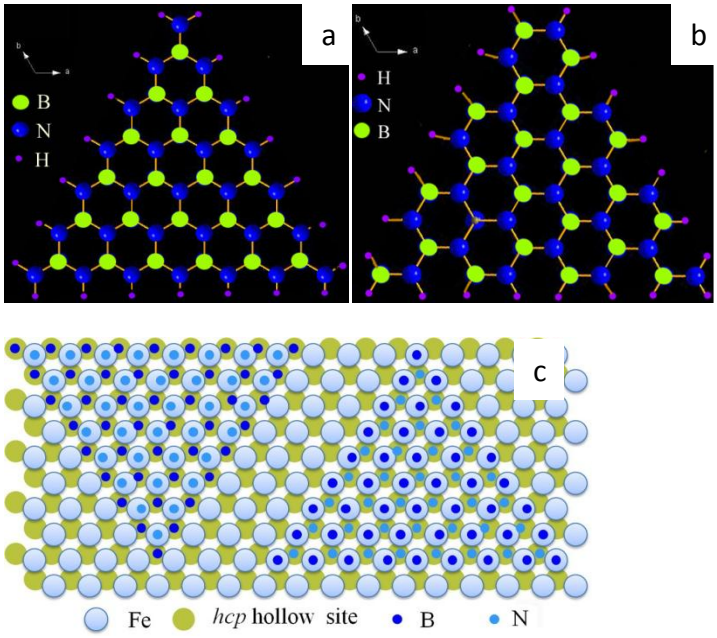

Fig. SI 2. Since the synthetic environment is rich in nitrogen and hydrogen, a BN monolayer terminated with N edges saturated by hydrogen is favored, two types of terminated edges: zigzag and armchair were show in (a) and (b), respectively. It is can be seen that the latter one expose the B and N atoms (b). As the BN islands were small, the stability of edges plays an important role. Rather than hexagonal BN monolayer, triangular monolayer was favored[1, 2]. Two types of islands correspond to *fcc* and *hcp* domains of h-BN/Fe (111) were shown in (c).

SI 3 Cathodoluminescence properties

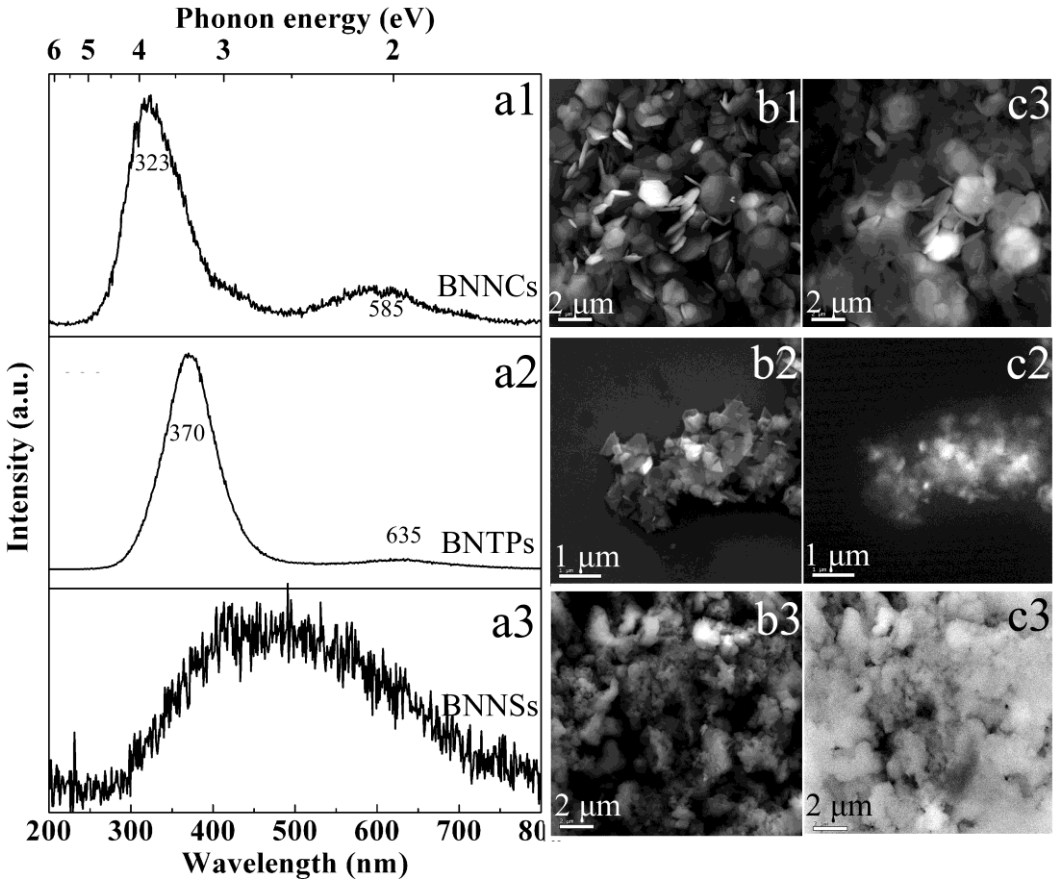

Fig. SI 3. The Cathodoluminescence of BNNCs (a1)[12a], BNTPs (a2) and BNNSs (a3) collected at room temperature. The corresponding SEM and CL images are shown in middle (b1, b2 and b3) and right panel (c1, c2 and c3).

Both curves of BNNCs (Fig. SI 3 a1) and BNTPs (Fig. SI 3 a2) show two emission peaks. The strong ultraviolet CL emission (300~400) can generally be attributed to the deep-level emissions associated with defect-related centres. The latter weaker peaks might be caused by Fe doping.

SI 4 TEM images for Ag/BN composite

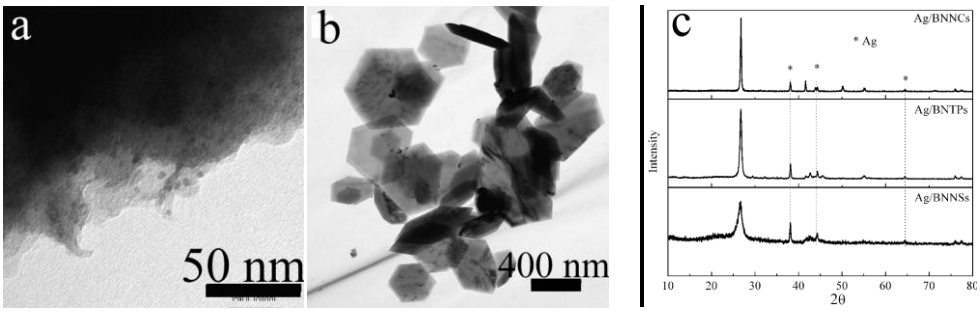

Fig. SI 4. TEM images of Ag/BNNSs (a) and Ag/BNNCs (b), the XRD patterns of three types of Ag/BN nanomaterials were shown in (c), the Ag was marked by "*", it is basically consistent with the JCPDs No. 04-0783. The Ag nanoparticles was estimated to be around 5~20 nm for the Ag/BNNSs and Ag/BNNCs.

SI references

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