Supplementary material (ESI) for Journal of Materials Chemistry

Supporting Information Available

A general route for the convenient synthesis of crystalline hexagonal boron nitride micromesh at mild temperature

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SI 1. Optical microscopy image of a h-BN micromesh.

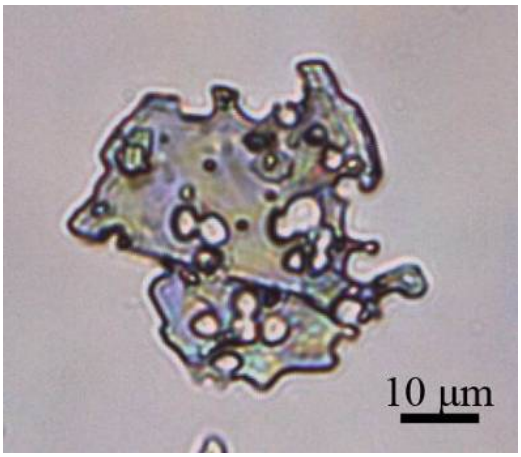
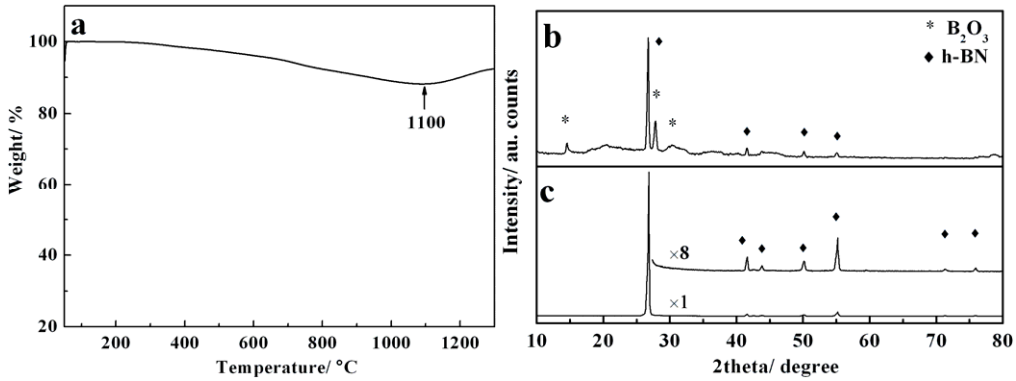


Figure SI 1. An optical microscopy image of an individual h-BN micromesh.

SI 2. Thermal stability of the as-obtained h-BN micromesh



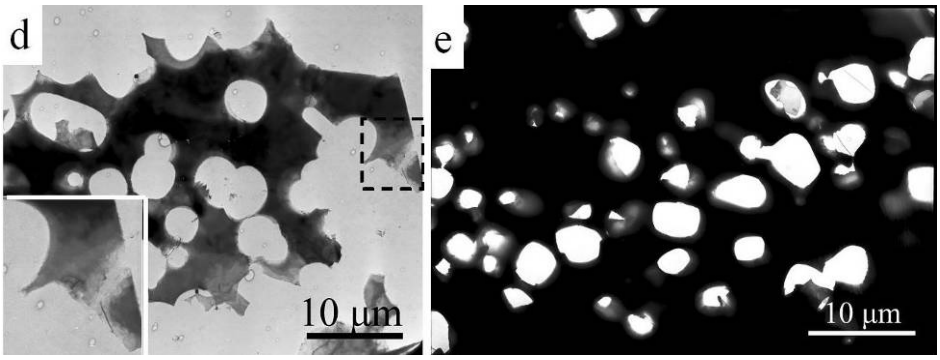


Figure SI 2. The TGA curve of the S_1 in the air (a). The XRD patterns of the S_1 calcined at 1100 °C (b) and 800 °C (c) in the air for 3 hours, and their corresponding TEM image, 1100 °C (d) , 800 °C (e). The inset in (d) shows the enlarged photo of the area framed by black dashed line..

In order to investigate the thermal stability of the as-prepared h-BN micromesh, the TGA analysis was carried out below 1300 °C in the air atmosphere. Figure SI 2a shows a typical TGA curve of S_1, indicating that the product has a relative high thermal stability below 300 °C. However there is a slight weight decrease in the curve between 300 and 1100 °C, which might be caused by the evaporation of low molecular weight volatile[1], The weight gain above 1100 °C might be attributed to the oxidization of the BN to B_2O_3. The oxide resistance of the S_1 was investigated by calcining the products at 1100 or 800 °C for 3 h in the air. It is evident from the diffraction peaks that both the B_2O_3 (JCPDS card no. 06-0297) and h-BN (JCPDS card no. 34-0421) were presented in the XRD pattern at 1100 °C (Figure SI 2b), which coincide with the weight gain in the TGA curve above 1100°C. Though the micromesh structure still reserved (Figure SI 2d), part of it become crushed (inset in Figure SI 2d) at the temperature. In case of 800 °C, the peaks in the XRD pattern can be indexed to h-BN. and no other noticeable peaks observed. And the main structure (Figure SI 2d) didn't have significant difference compared with the sample before calcining. When compared with the boron nitride nanotube, h-BN powder[2] and whisker-like nano crystalline[3] which show obvious weight gain between 700 ºC and 1000 ºC, the above results indicate that the as-prepared sample has a relatively high thermal stability and oxide resistance.

SI 3. The XRD patterns of graphite, CrN and VN.

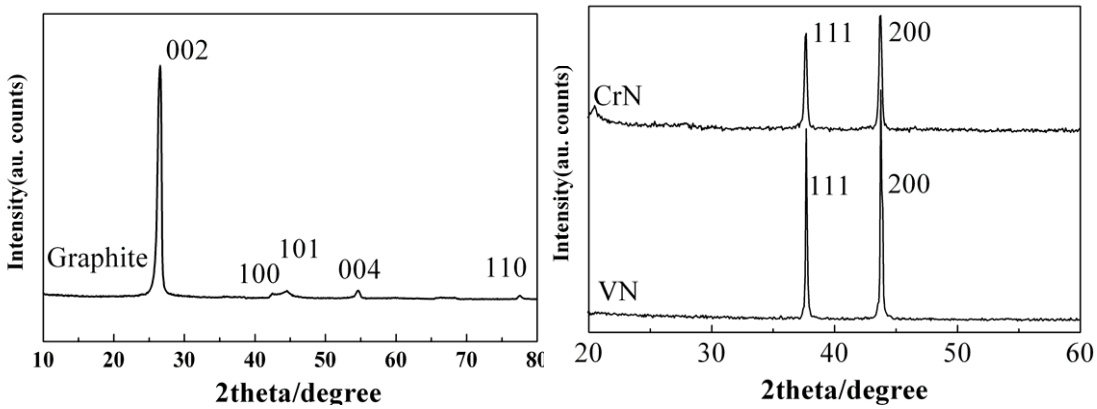


Figure SI 3. The XRD pattern of the graphite (JCPDS card no. 41-1487) prepared by NH_4HCO_3 and Mg powder (left panel), CrN (JCPDS card no. 65-4307) and VN (JCPDS card no. 65-5288) prepared by their oxides, Mg and NaN_3 (right panel)

Table SI 1 the reaction conditions of the graphite, CrN and VN.

reaction system	Amount used (mmol)	T (ºC)	final products
NH4HCO3 + Mg	60 + 125	500	graphite micromesh (>50%)
Cr_2O_3 + Mg + NaN_3	20 + 62 + 61	500	CrN
V_2O_5 + Mg + NaN_3	10 + 62 + 61	500	VN

SI 4. The nitrogen absorption and desorption isothermal measurement of the product.

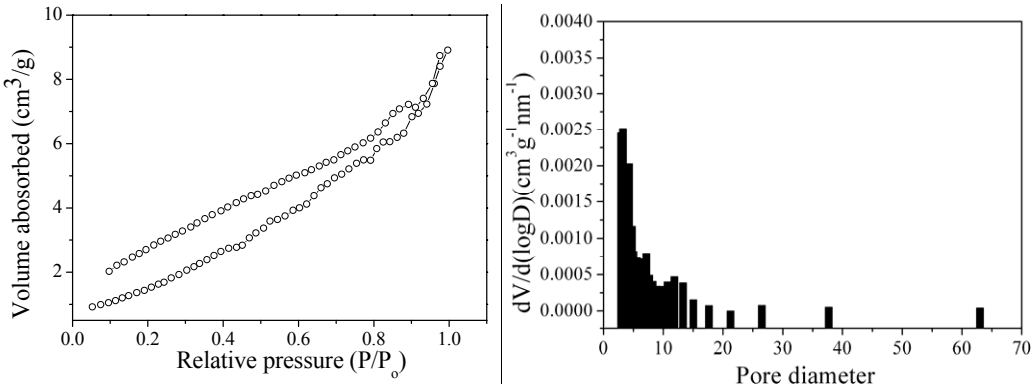


Figure SI4 The nitrogen absorption and desorption isothermal plot of the h-BN micromesh (left panel) and BJH pore size distribution of the h-BN micromesh.

The nitrogen absorption and desorption isothermal plot of the S_1 is shown in Figure SI4 left panel. The corresponding BJH pore size distribution is shown in Figure SI4 right panel. The pore size of the products is 3.2 nm and BET surface area of the product is 6.9 m^2/g.

Supporting information reference

[1]. N. Jacobson; S. Farmer; A. Moore; H. Sayir, *J. Am. Ceram. Soc.* 1999**, 82**, 393.

[2]. Y. Chen, J. Zou, S. J. Campbell and G. Le Caer, *Appld Phys. Lett.*, 2004, **84**, 2430.

[3]. J. Ma, J. Li, G. Li, Y. Tian, J. Zhang, J. Wu, J. Zheng, H. Zhuang and T. Pan, *Mater. Res.Bull.* 2007, **42**, 982.