Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information

Ultrafine Porous Boron Nitride Nanofibers Synthesized via Freeze-drying and Pyrolysis Process and Their Adsorption Properties

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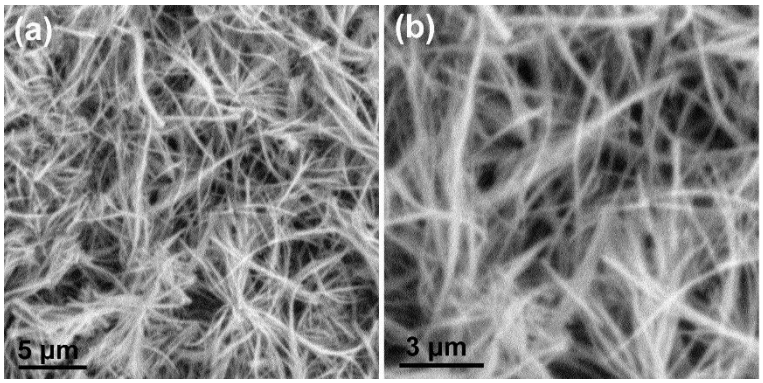

Figure S1 SEM image of the M 2B ($C_3N_6H_6$ $2H_3BO_3$) precursor, displaying 1D nanofibers with high purity.

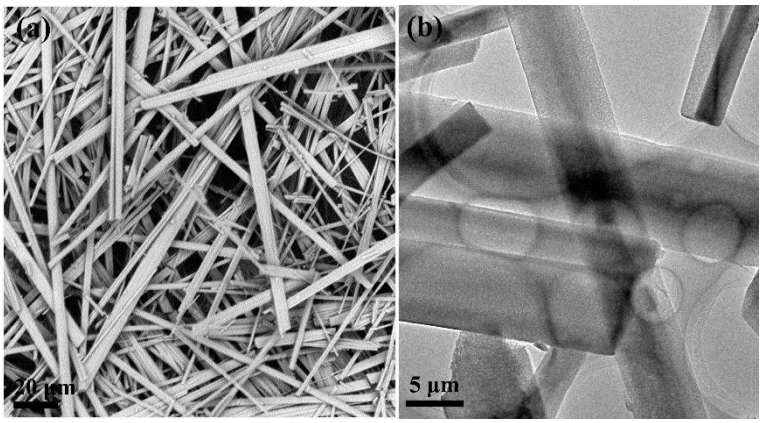

Figure S2 (a) SEM image of M-2B whiskers. (b) TEM images of porous BN whiskers with diameters of 5-10 μm. The whiskers were synthesized via a naturally cooling process instead of the liquid nitrogen freeze-drying treatment. In detail, 4.64 g of H_3BO_3 and 3.15 g of $C_3N_6H_6$ were dissolved in 250 ml of distilled water. The reaction mixtures were heated at 85 ℃ for 4 h. Then the hot aqueous solution was naturally cooling (~ 6 h) to room temperature to get the white precipitate. The samples were dried at 90 ℃ for 12 h to obtain M-2B whiskers as precursor. After the high-temperature pyrolysis treatment, porous BN whiskers were obtained.

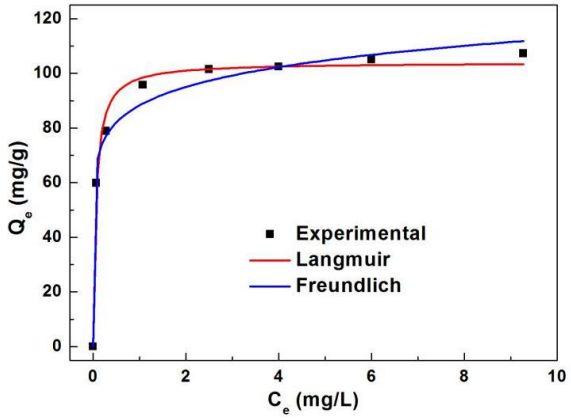

Figure S3 Adsorption isotherms of MB on the porous BN nanofibers.

Table 1. Isotherm parameters for the adsorption of MB on porous BN nanofibers.

Langmuir model			Freundlich model		
K_L (L mg^{-1})	q_m (mg/g)	R^2	K_F	n	R^2
10	107.3	0.989	100	5	0.983

We have analyzed the adsorption data by the Langmuir and Freundlich isotherms models. The Freundlich isotherm is an empirical equation which can be written as $Q_e = KC_e^{1/n}$, where, *K* and

n are the Freundlich adsorption constants, which indicate that the extent of the adsorption and the degree of nonlinearity between adsorption and solution concentration, respectively.

The Freundlich model has usually been employed to represent the heterogeneous systems, while Langmuir model corresponds to complete monolayer coverage. As shown in Figure S3 and Table 1, our experimental data fit the Langmuir model well, with the correction coefficient (R^2) of 0.989. While for the Freundlich model, the correlation coefficients (R^2) is 0.983. This result reveals that the adsorption of MB takes place in the specific homogeneous sites within the adsorbents and all sites were equal (equal energies and enthalpies).

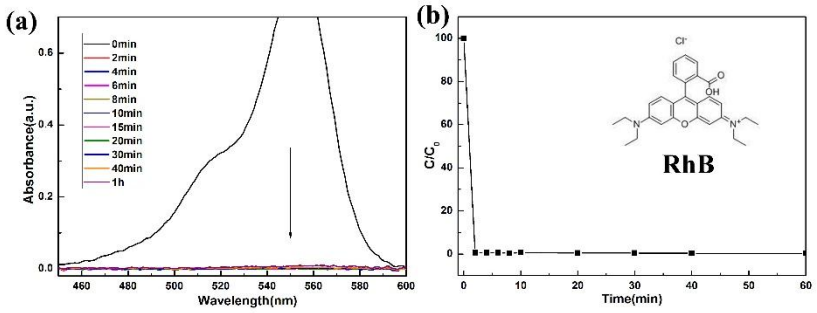

Figure S4 (a) UV-Vis absorption spectra of the Rhodamine B (RhB) solution (20 mg/L, 200 ml) at different time intervals after adding 50 mg porous BN nanofibers. (b) The corresponding adsorption rate curve. The present porous BN nanofibers display an ultrafast adsorption rate for RhB removal since the adsorption equilibrium could be achieved almost within ~2 min. The maximum adsorption capacity of porous BN nanofibers for RhB is 237 mg/g.