Electronic Supplementary Information (ESI)

Flower stamen-like porous boron carbon nitride nanoscrolls for water cleaning

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Contents:

1. Experimental details.

Materials Preparation:

All reagents were obtained from commercial sources (Sigma Aldrich) and were used without further purification. In a typical synthesis, 0.5g poly (ethylene oxide-co-propylene oxide) (P123) was dissolved in 80°C deionized water at first. After that, 0.46g urea was added in the solution, followed by adding 0.23g boric acid under magnetic stirring for 1 hour to yield mixture. The mixture was further dried and grinded into precursor powders. Subsequently, the resultant precursors were loaded in a quartz boat and then annealed at 900°C at a ramp rate of

5°C/min for 2h under N_2 flow. The samples without adding P123 were prepared under the same condition.

Materials Characterization:

X-ray powder diffraction (XRD) (PANalytical X'Pert PRO system) was performed with Cu Kα radiation with 2θ ranging from 15° to 60°. Fourier Transform Infrared (FTIR) was performed on a Bruker Vertex 70 FTIR with range of 4000-600 cm^{-1}. X-ray photoelectron spectroscopy (XPS) was carried out on an ESCALAB 250 instrument equipped with using non-monochromatised Mg-Ka X-rays as the excitation source. Raman tests were processed on a Renishaw Raman spectrometer with a laser wavelength of 514.5 nm at room temperature. The sample morphology was characterized by using a Zeiss Supra 55 VP Scanning electron microscopy **(**SEM). Transmission electron microscopy (TEM) were performed on a JEOL 2100F (operating at 200 kV) apparatus. Nitrogen adsorption and desorption isotherms were processed in a Tristar 3000 apparatus at 77 K.

Dye absorption tests:

The experimental was processed as the work in our group reported before.[1] Generally, dye solutions (Congo red (CR) and methyl blue (MB)) of different concentrations were prepared by dissolving appropriate amounts of CR and MB into deionized water, respectively. In a typical adsorption of CR experiment, 20mg of the porous BCN nanoscrolls were added into 25 ml CR aqueous solution (110mg l^{-1}) under stirring, and UV–vis absorption spectra were recorded at different time intervals to monitor the process at 496 nm. The adsorption isotherm was obtained by varying the initial CR concentration. The adsorption studies of MB were similar to those of CR except for the detection wavelength difference (665 nm for MB).

The adsorption isotherms are fitted (correlation coefficients, R>0.99) by using the Langmuir adsorption model:

$$Q_e=Q_m bC_e/(1+bC_e)$$

Where Q_e (mg g^{-1}) is the amount of dyes adsorbed at equilibrium, Ce (mg l^{-1}) is the equilibrium solute concentration, Q_m is the maximum adsorption capacity corresponding to complete monolayer coverage, and b is the equilibrium constant (l mg^{-1}).

2.

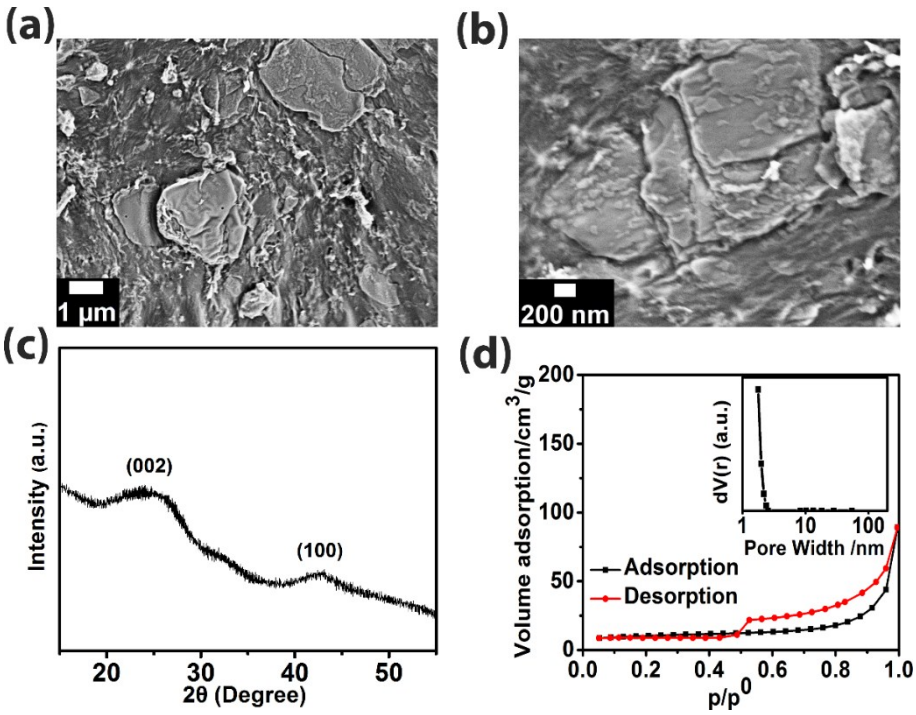

Figure S1. a) and b) SEM image, c) XRD pattern and d) Nitrogen adsorption/desorption isotherms of samples synthesized without P123.

3.

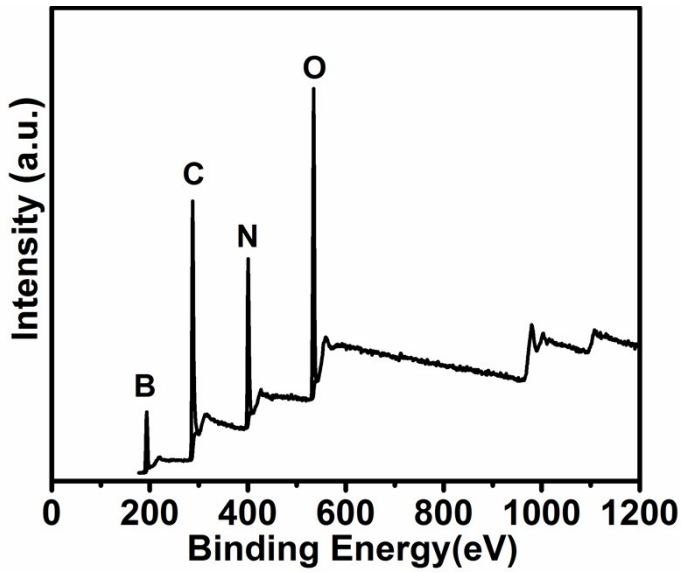

Figure S2. XPS survey spectra of the porous BCN nanoscrolls.

4.

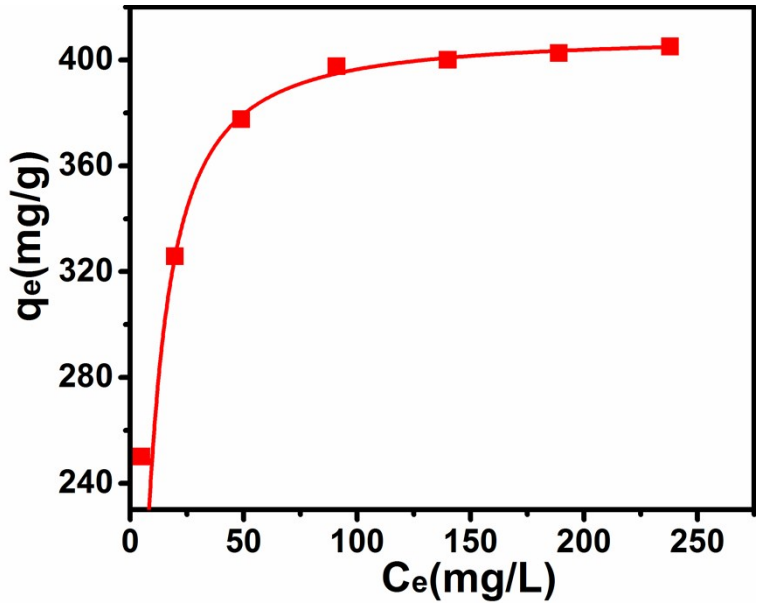

Figure S3. Adsorption isotherms of activated carbon (AC) on Congo red adsorption.

5.

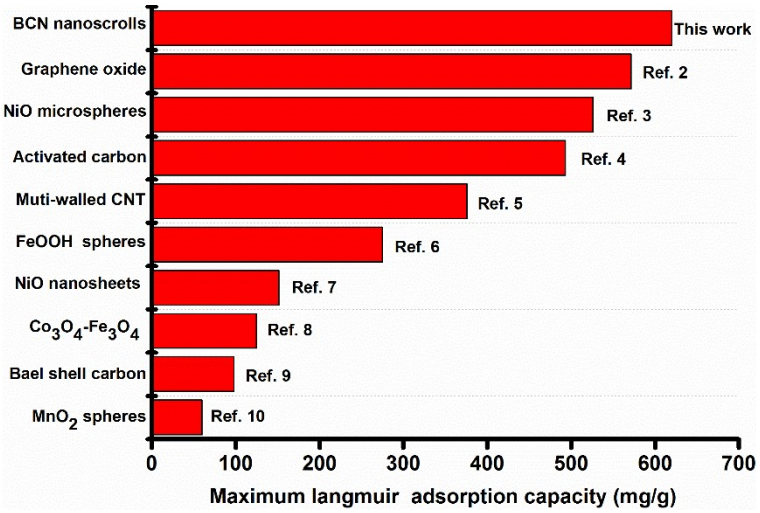

Figure S4 Comparison of Congo red adsorption capacities of BCN nanoscrolls and other adsorbents.

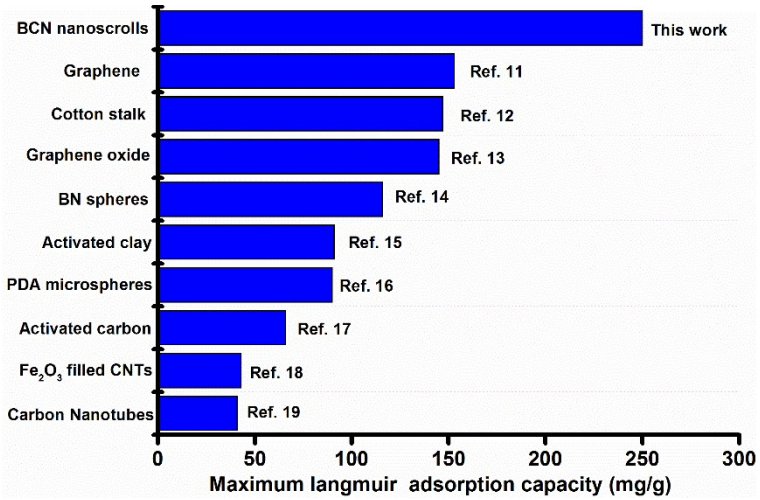

Figure S5 Comparison of methyl blue adsorption capacities of BCN nanoscrolls and other adsorbents.

6.

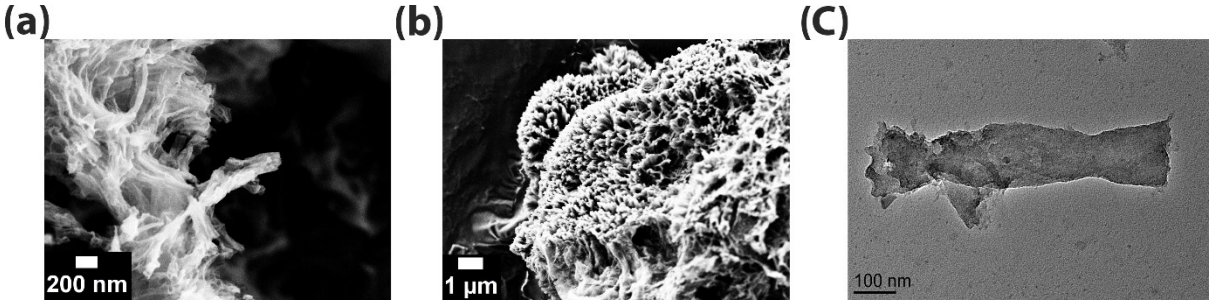

Figure S6. a) and b) SEM images and c) TEM images of BCN nanoscrolls after CR absorption.

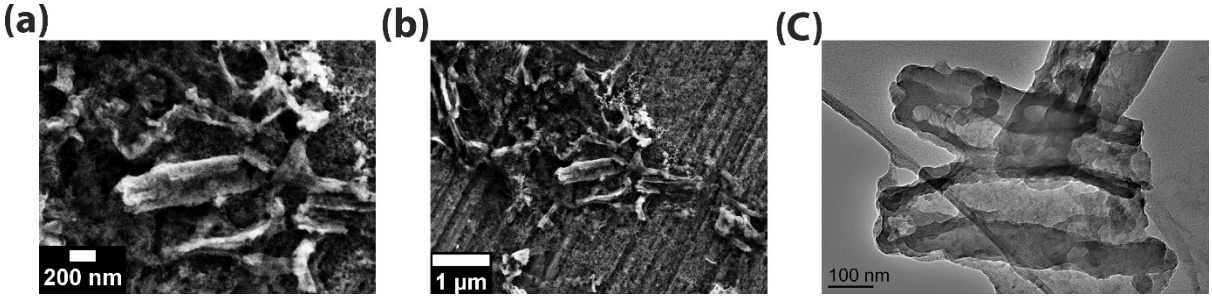

Figure S7. a) and b) SEM images and c) TEM images of BCN nanoscrolls after MB absorption.

Reference and notes

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