Porous carbon material derived from fungal hyphae and its application for removal of dye

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S1. Experimental

S1.1. Reusability of PCFH

The stability and reusability of PCFH for removal of RhB were investigated through multicycle tests. In a typical process, the PCFH (20 mg) was added into the dyes solutions (100 ml, 200 mg L^{-1}) . After each cycle, the used sample would be separated from the solution by filtration, and then activated with the solutions of NaCl and DMF under ultrasound at room temperature to remove the adsorbed RhB. The re-generated sample powders would be dried at 80 °C for 12 h and reused as absorbents in next experiments.

S2. Results and discussion

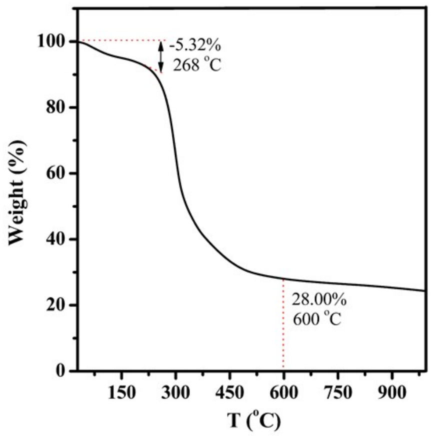

Fig. S1. The TG curve of FH.

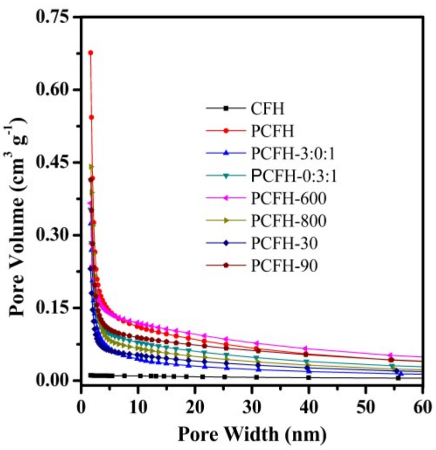

Fig. S2. The BJH pore size distribution of CFH and PCFH prepared at different conditions.

Table S1 The element contents of the FH, CFH, and PCFH.

Item	C (%)	O (%)	N (%)	P (%)
FH	77.75	19.28	2.29	0.68
CFH	83.13	12.63	3.28	0.96
PCFH	91.51	6.75	1.69	0.05

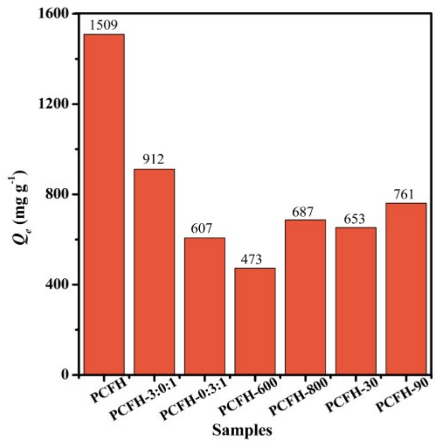

Fig. S3. The adsorption capacities of PCFH prepared at different conditions (Dye: RhB; C_0: 400 mg L^{-1}; V: 100 mL; pH: 3.4 ± 0.1; Adsorbent: 10 mg).

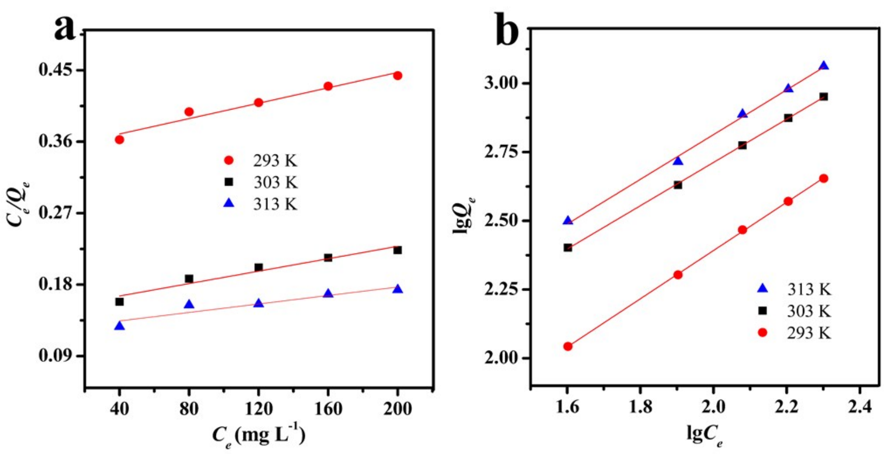

Fig. S4. Plots of (a) Langmuir isotherm and (b) Freundlich isotherm at 293, 303, and 313 K, respectively.

S2.1. Reusability of PCFH

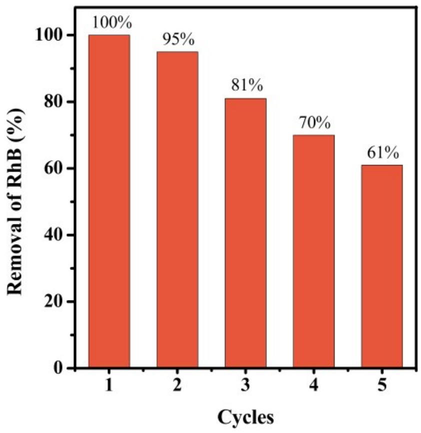

Fig. S5. Reusability of PCFH.

The stability and reusability of PCFH for removing RhB were investigated through the multicycle tests. The experiments of testing reusability of the PCFH were shown in the Fig. S5. As shown in Fig. S5, the dye adsorption capacity of PCFH decreased to 81% after 3 cycles and 61% after 5 cycles compared with that of fresh PCFH sample.

Table S2 Comparison of the adsorption capacities of PCFH to RhB with other adsorbents.

Adsorbent	Q_e (mg g^{-1})	References
Starch grafted p-tert-butyl-calix[n]arene	13	[S1]
EMCs	22	[S2]
Sodium montmorillonite clay	42	[S3]
Kaolinite	46	[S4]
Activated carbon prepared from Phoenix Sylvestric leaves	52	[S5]
Graphene oxide/silicalite-1 composites	57	[S6]
Phosphoric acid treated parthenium carbon (PWC)	59	[S7]
Green microalgae Chlorella pyrenoidosa	63	[S8]
Graphene oxide/Beta zeolite composite materials	64	[S9]

Animal Bone Meal	65	[S10]
Milled sugarcane bagasse	66	[S11]
Jute stick powder	88	[S12]
Activated carbon prepared from the steel and fertilizer industries	91	[S13]
Waste seeds Aleurites moluccana (WAM)	117	[S14]
MoS_2-glue sponge	127	[S15]
Modified carbon xerogels	132	[S16]
Activated carbon derived from carbon residue from biomass gasification	190	[S17]
Hierarchical SnS_2 nanostructure	200	[S18]
Functionalized graphene via tannic acid	201	[S19]
Polymer nanocomposite was prepared using formaldehyde and resorcinol	208	[S20]
Tannery residual biomass (TRB)	250	[S21]
Gelatin/activated carbon composite beads	256	[S22]
Activated carbon prepared from bagasse pith	264	[S23]
Polymer modified biomass of baker's yeast	267	[S24]
Activated carbon derived from scrap tires	307	[S25]
Magnetic AC/CeO_2	325	[S26]
Pyruvic acid (PA)-modified activated carbons	385	[S27]
N-vinylimidazole modified hyper-cross-linked resins	421	[S28]
Treated rice husk-based activated carbon	518	[S29]
Gum ghatti and Fe_3O_4 magnetic nanoparticles based nanocomposites	655	[S30]
Raphia hookerie fruit epicarp	667	[S31]
Porous carbon material based on quinoa husk	759	[S32]
Porous carbon material based on corn straw	1578	[S33]

FH	16	This work
CFH	18	This work
PCFH	1912	This work

Reference

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