Electronic Supplementary Information (ESI)

Controllable Conversion of Prussian blue@yeast bio-template into 3D Cage-like Magnetic Fe_3O_4@N-doped Carbon Absorbent and its Cohesive Regeneration by Persulfate Activation

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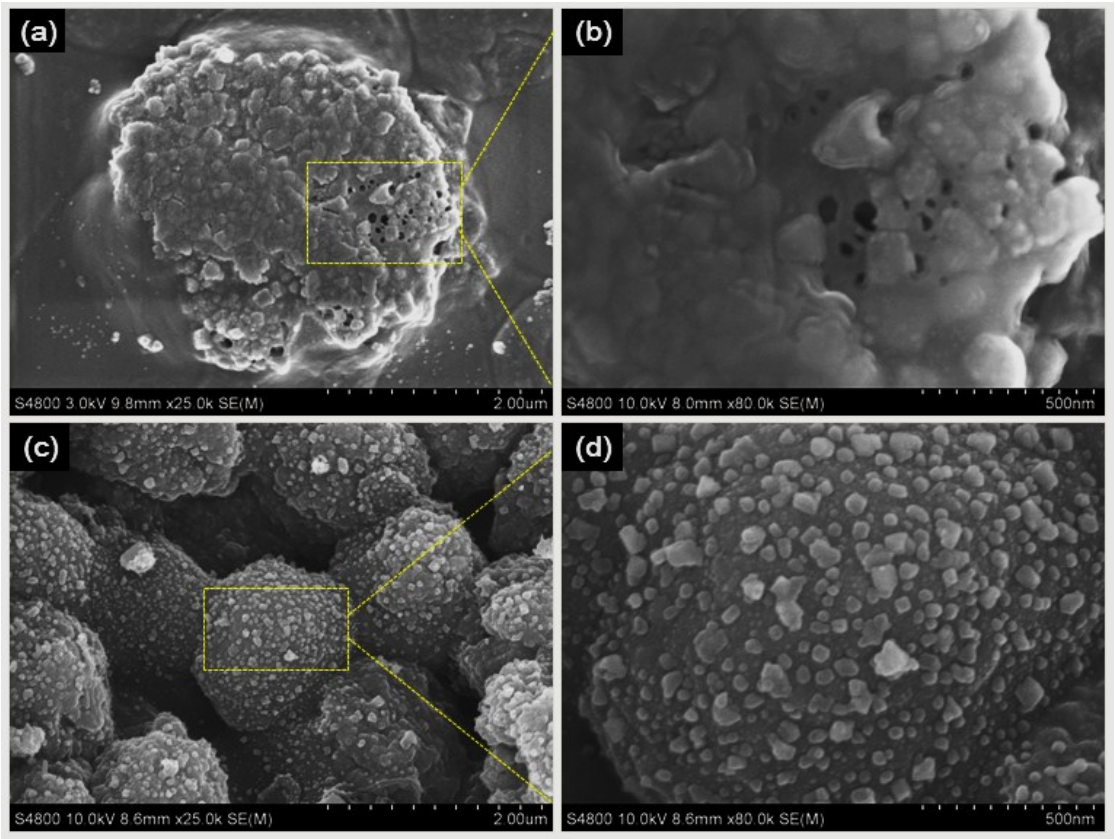

Fig. S1 FE-SEM images of (a-b) Fe_3O_4@C (1:0.05) and (c-d) Fe_3O_4@C (1:0.22).

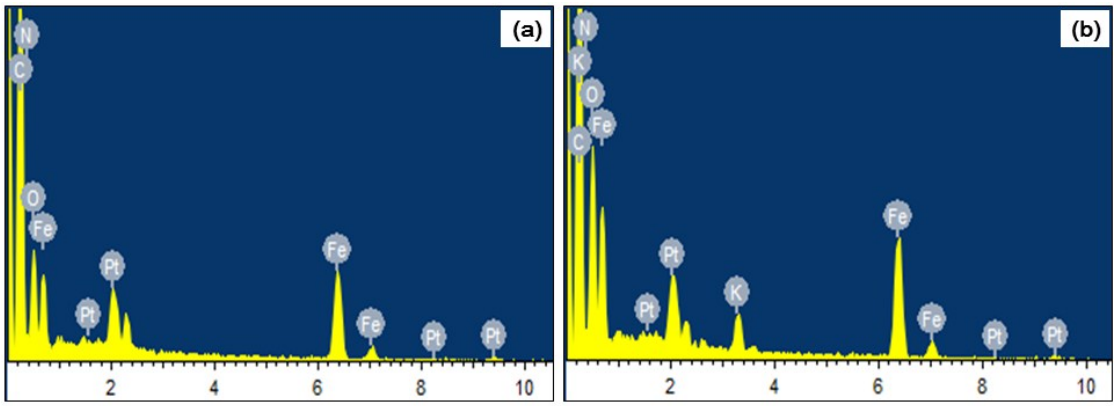

Fig. S2 EDS analysis of (a) Fe_3O_4@C (1:0.05) and (b) Fe_3O_4@C (1:0.22).

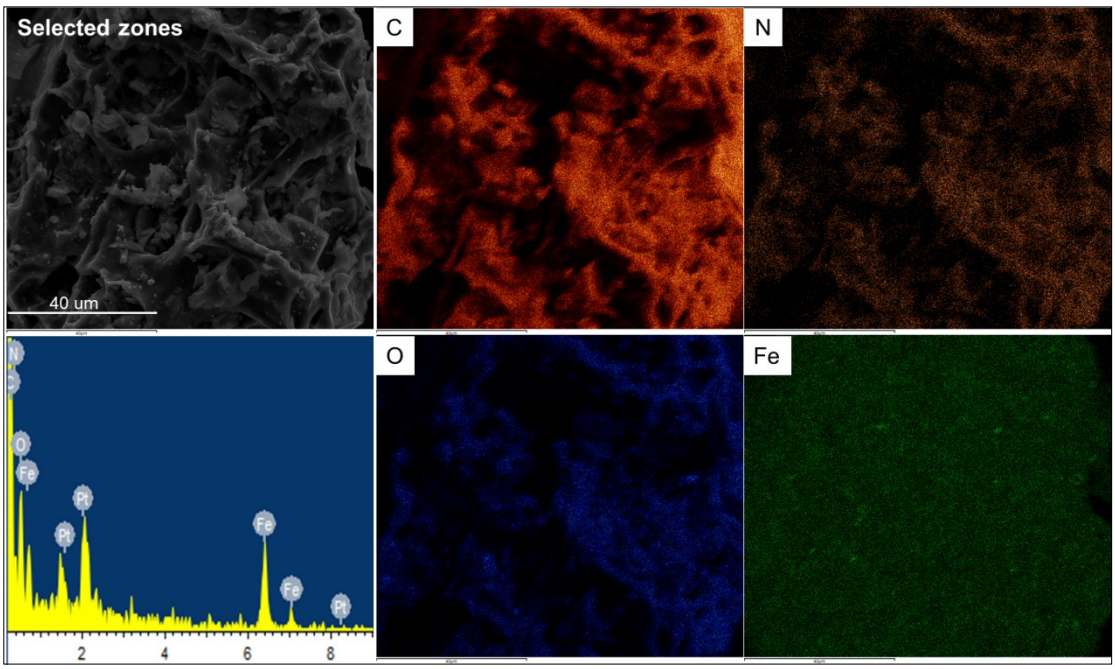

Fig. S3 EDS analysis of N-doped Fe_3O_4@C (1:0.11) and the corresponding mapping images.

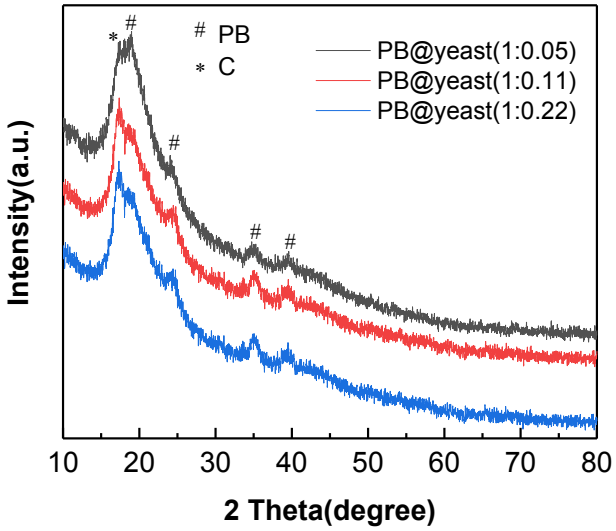

Fig. S4 XRD patterns of PB@yeast bio-templates.

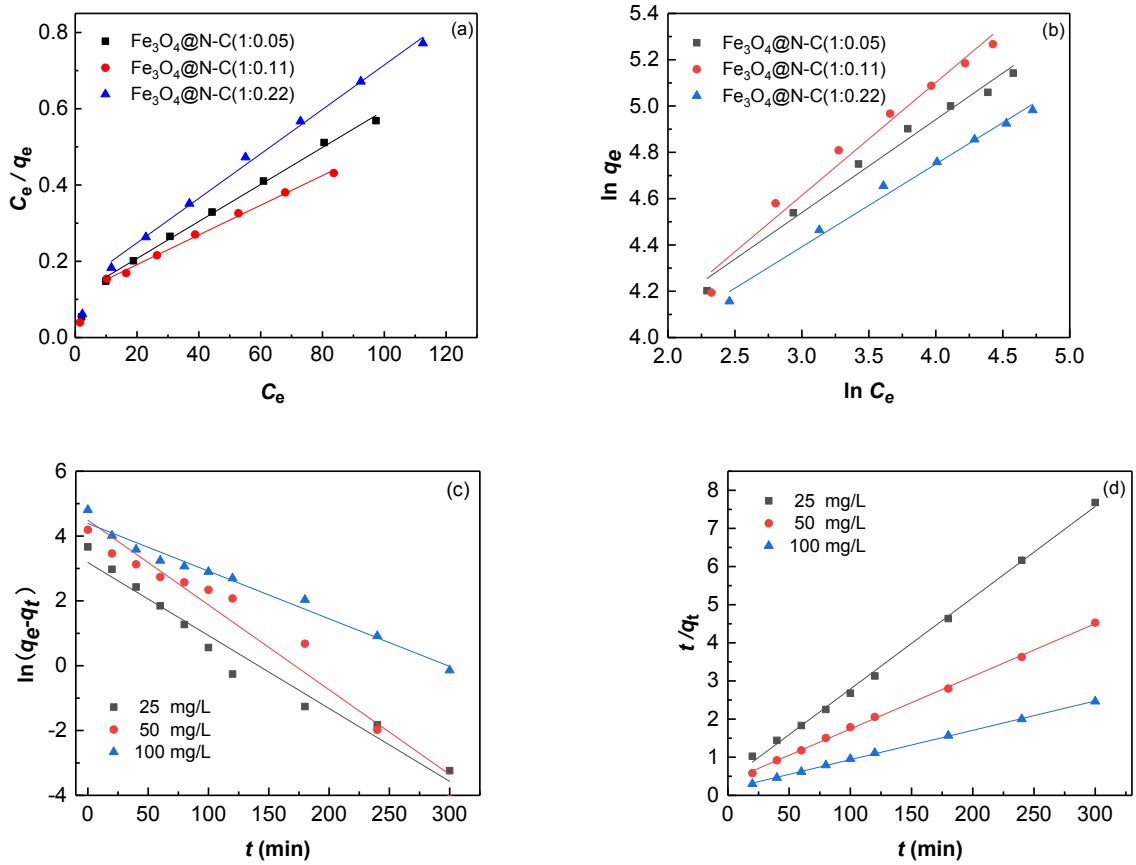

Fig. S5 Linear fits of experimental data for (a) Langmuir isotherm model; (b) Freundlich isotherm model; (c) pseudo-first kinetic model; (d) pseudo-second kinetic model.

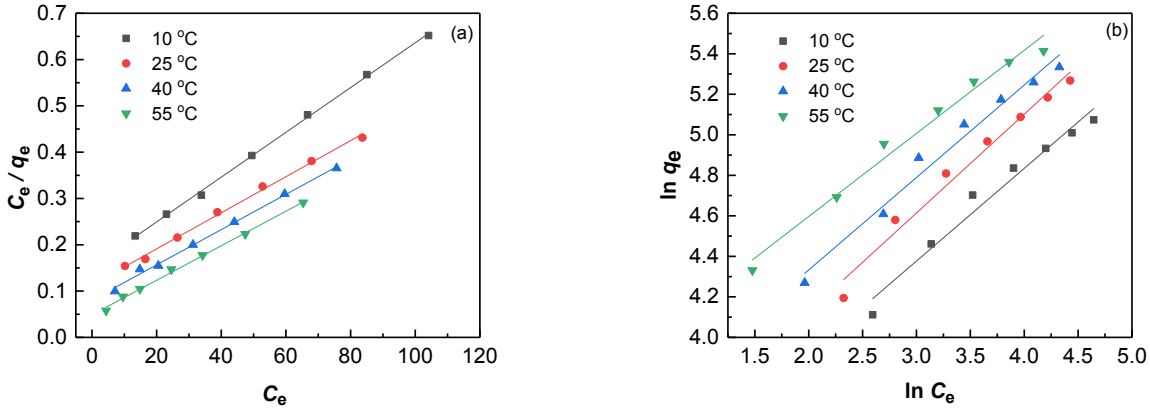

Fig. S6 Linear fits at different temperature for (a) Langmuir isotherm model and (b) Freundlich isotherm model.

Table S1 Comparison of maximum adsorption capacities of adsorbents for RhB in previous literatures

Adsorbent	T (°C)	pH	q_{max} (mg·g^{-1})	References
gelatin/activated carbon composite beads(GE/AC)	60	4.0	256.41	[1]
Fe_3O_4/RGO	60	5.3	142.86	[2]
In-MOF@GO-2	25	6.0	267	[3]
iron-pillared bentonite (Fe-Ben)	25	5.0	98.6	[4]
carbonaceous adsorbent (TPC)prepared from Thespusia populinia bark	60	7.0	77.18	[5]
Fe_3O_4@N-C (1:0.05)	25	6.0	206.19	This study
Fe_3O_4@N-C (1:0.11)	25	6.0	257.06	This study
Fe_3O_4@N-C (1:0.22)	25	6.0	171.53	This study

Table S2 Kinetic parameters for RhB adsorption at different initial concentration

Kinetic models	Parameters	C_0 of RhB ($mg \cdot L^{-1}$)		
		25	50	100
Pseudo-first-order	$q_{e,exp}$ ($mg \cdot g^{-1}$)	39.06	66.28	122.61
	$q_{e,cal}$ ($mg \cdot g^{-1}$)	8.65	12.20	11.93
	k_1 (min^{-1})	0.0225	0.0262	0.0147
	R^2	0.9643	0.9515	0.9747
pseudo-second-order	$q_{e,cal}$ ($mg \cdot g^{-1}$)	41.77	72.46	129.87
	$k_2 \times 10^{-3}$ ($g \cdot mg^{-1} min^{-1}$)	1.4537	0.5262	0.3576
	R^2	0.9977	0.9989	0.9993
intra-particle diffusion	k_{1d} ($mg \cdot g^{-1} min^{-0.5}$)	4.6083	5.6125	10.3763
	R^2	0.9788	0.9968	0.9841
	k_{2d} ($mg \cdot g^{-1} min^{-0.5}$)	1.7468	2.3845	3.2649
	R^2	0.9605	0.9960	0.9961
	k_{3d} ($mg \cdot g^{-1} min^{-0.5}$)	0.0959	0.1495	0.9077
	R^2	0.8401	0.5680	0.9273

Table S3 Adsorption isotherm parameters for RhB adsorption at different temperatures

T (°C)	Langmuir Model				Freundlich Model		
	q_{max} (mg·g^{-1})	K_L (L ·g^{-1})	R^2	R_L	1/n	K_F (L ·g^{-1})	R^2
10	206.61	0.0317	0.9988	0.14-0.39	0.4575	8.1669	0.9709
25	257.06	0.0343	0.9965	0.13-0.37	0.4874	8.5676	0.9778
40	262.46	0.0437	0.9954	0.10-0.30	0.4564	9.2963	0.9772
55	268.10	0.0764	0.9965	0.06-0.21	0.4101	10.265	0.9825

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