Note Added After First Publication: This ESI file replaces the original version, first published on 12th October 2015. The authors regret that in the original version the y-axes of the graphs in Fig. S4 and S5 were labelled incorrectly. The labelling of both axes is herein corrected to "Adsorption capacity (q_t)/mg g^{-1}".

The Royal Society of Chemistry apologises for these errors and any consequent inconvenience to authors and readers.

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Electronic Supplementary Information

Amyloid Fibrils as Rapid and Efficient Nano-biosorbents for Removal of Dye Pollutants

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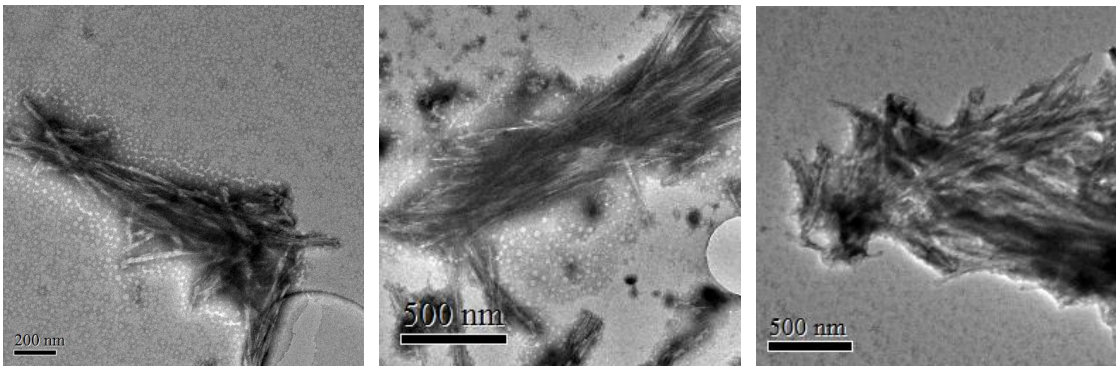
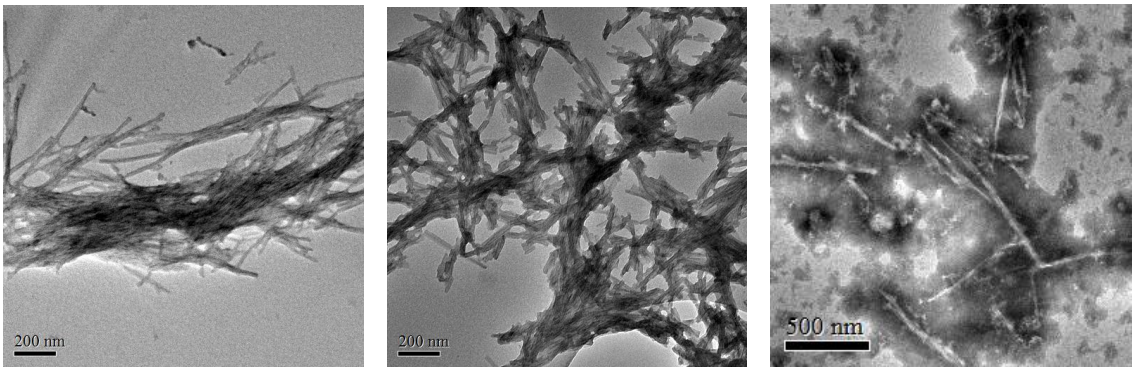
(A) Incubation at pH 3.0:



t = 15 min t = 1 day t = 100 days

(B) Incubation at pH 11.0:



t = 15 min t = 1 day t = 100 days

Figure S1. Transmission electron miscroscopic (TEM) studies of lysozyme nanofibers incubated in acidic and alkaline media at different time intervals. Lysozyme nanofibers were incubated at (A) pH 3.0 and (B) pH 11.0 for 15 min, 1 day and 100 days.

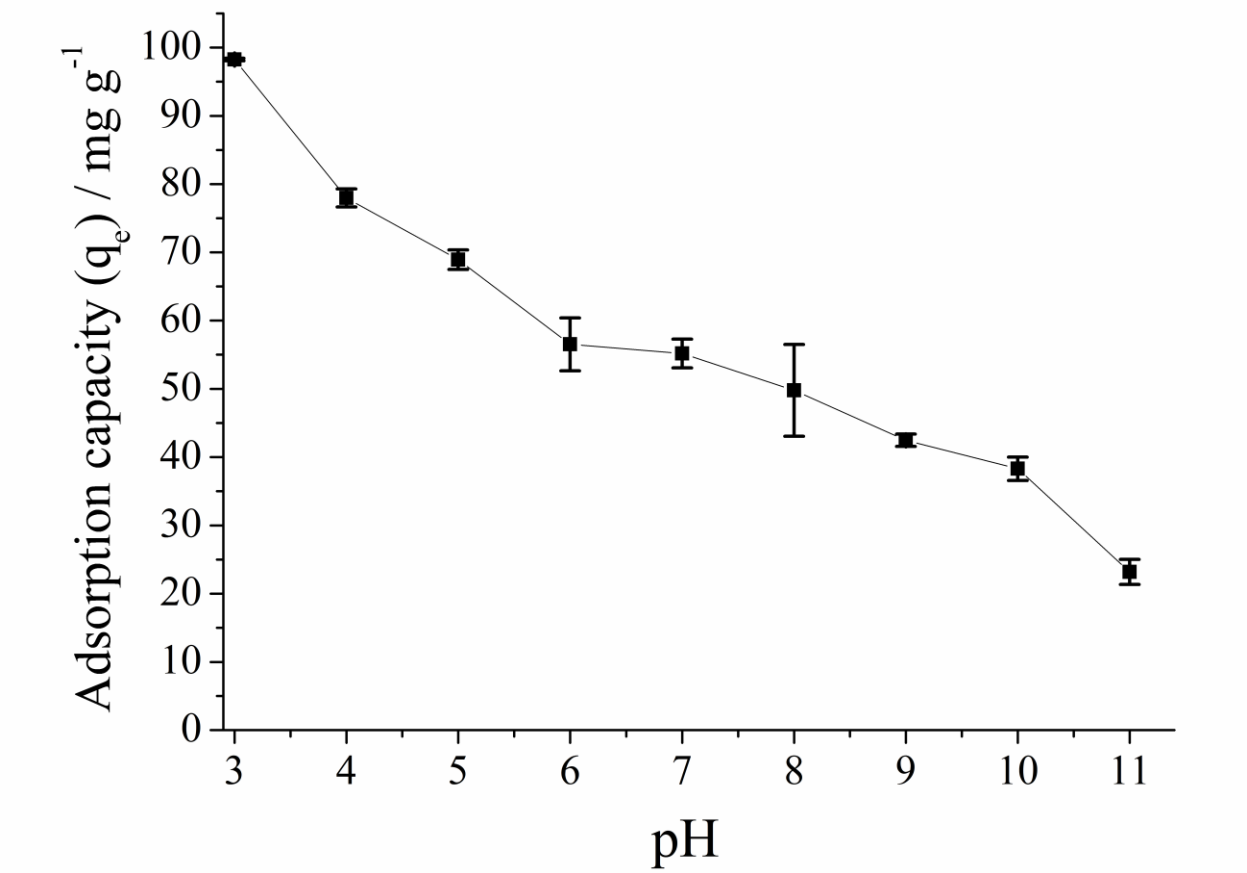


Figure S2. Adsorption capacities of lysozyme nanofibers with Acid Blue 29 at different pH values. Solution conditions of Acid Blue 29: dye concentration = 67 mg L^{-1} (109 μM); solution volume = 3.0 mL. Lysozyme nanofibers (1.8 mg) were added to the Acid Blue 29 solution at each pH for dye adsorption. Triplicate measurements were performed at each pH value.

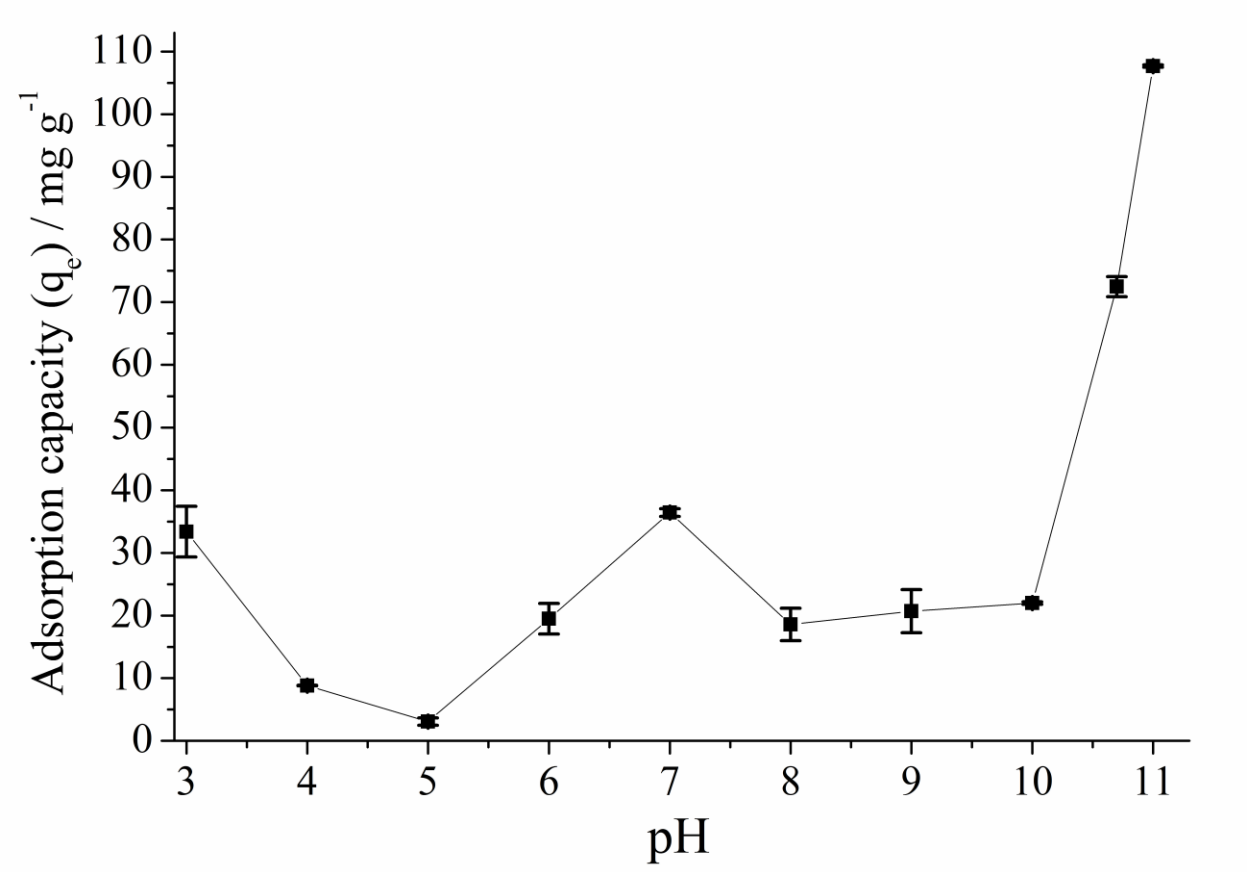


Figure S3. Adsorption capacities of lysozyme nanofibers with Victoria Blue B at different pH values. Solution conditions of Victoria Blue B: dye concentration = 55 mg L^{-1} (109 μM); solution volume = 3.0 mL. Lysozyme nanofibers (1.8 mg) were added to the Victoria Blue B solution at each pH for dye adsorption. Triplicate measurements were performed at each pH value.

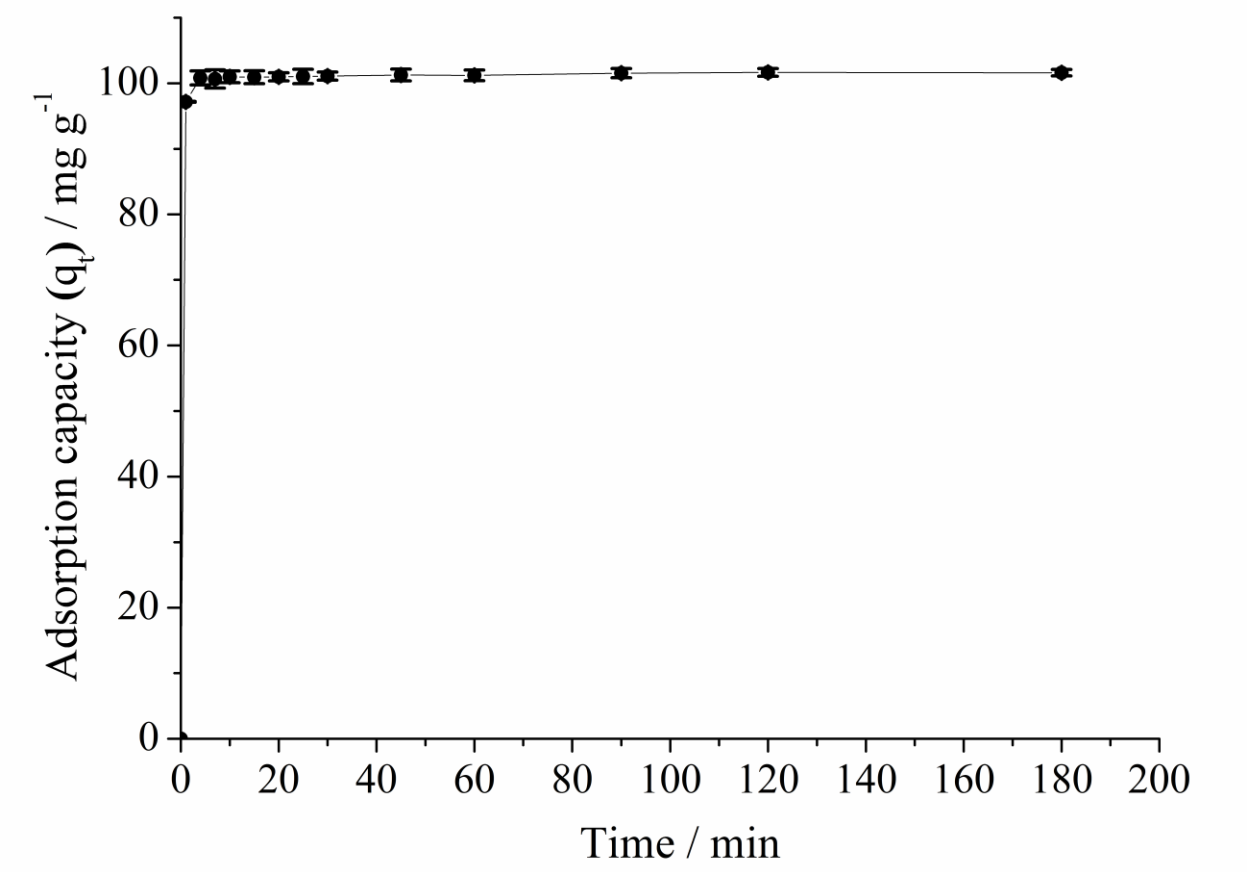


Figure S4. Kinetic profile of the adsorption of Acid Blue 29 by lysozyme nanofibers. Solution conditions of Acid Blue 29: dye concentration = 67 mg L^{-1} (109 μM); volume = 40.0 mL; pH 3.0. Lysozyme nanofibers (24 mg) were added to the Acid Blue 29 solution for dye adsorption. The adsorption capacities of lysozyme nanofibers at different time intervals were determined by absorbance measurements on the dye solution before and after dye adsorption. Triplicate measurements were conducted at each time interval.

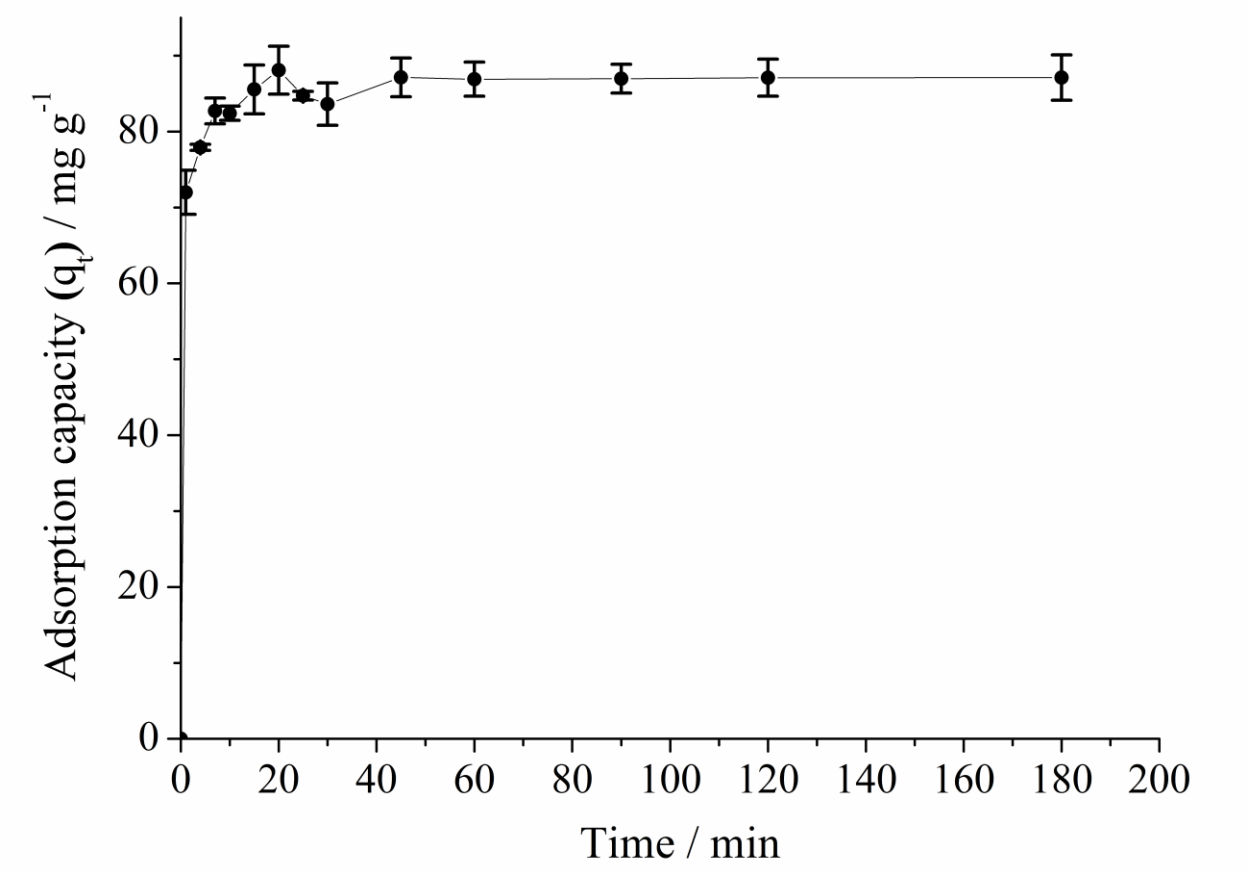


Figure S5. Kinetic profile of the adsorption of Victoria Blue B by lysozyme nanofibers. Solution conditions of Victoria Blue B: dye concentration = 55 mg L^{-1} (109 μM); volume = 40.0 mL; pH 10.7. Lysozyme nanofibers (24 mg) were added to the Victoria Blue B solution for dye adsorption. The adsorption capacities of lysozyme nanofibers at different time intervals were determined by absorbance measurements on the dye solution before and after dye adsorption. Triplicate measurements were conducted at each time interval.

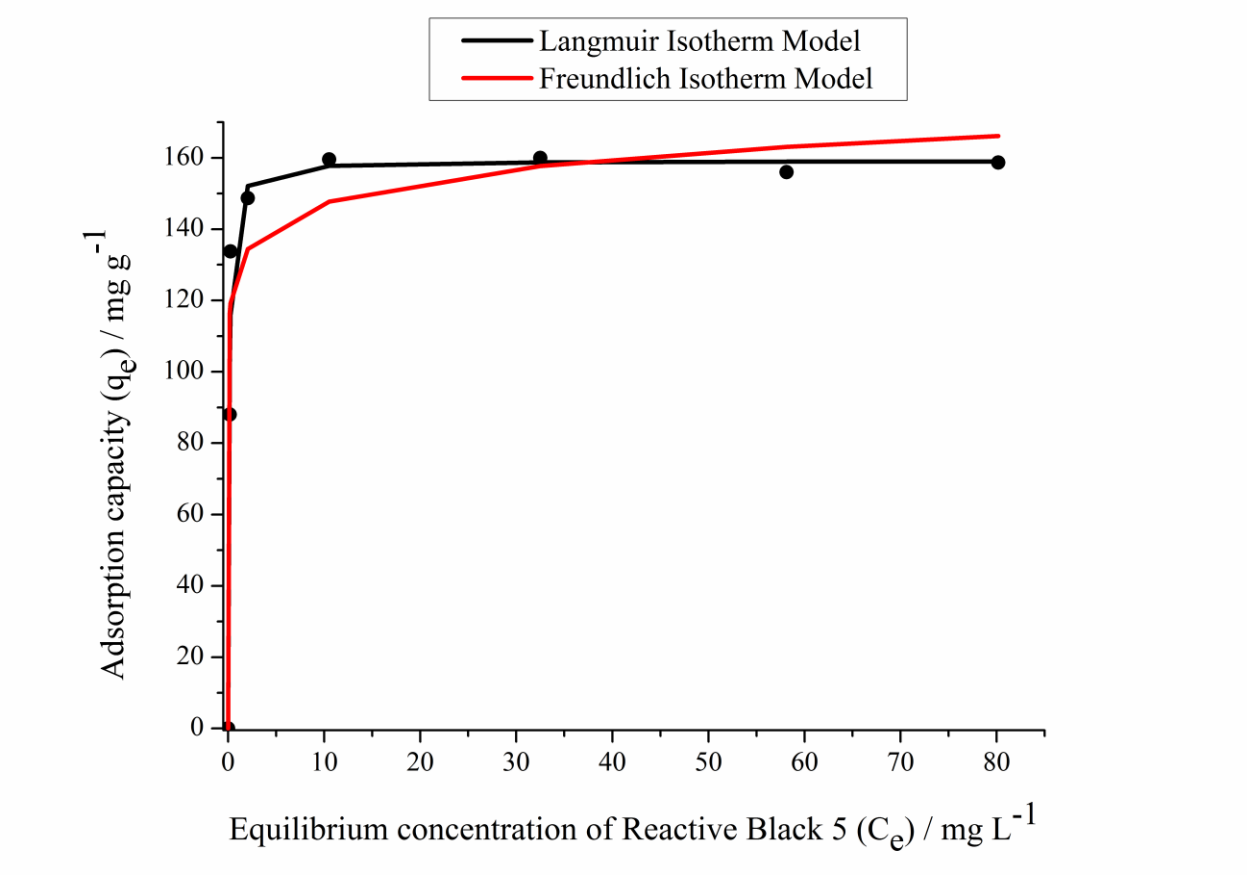


Figure S6. Adsorption isotherms of lysozyme nanofibers with Reactive Black 5. The black and red lines represent the Langmuir isotherm model and the Freundlich isotherm model, respectively. Adsorption conditions: initial concentrations of Reactive Black 5 = 0, 54, 82, 96, 109, 136, 164 and 191 mg L^{-1} (solution volume = 3.0 mL, pH 3.0); amount of lysozyme nanofibers in each solution = 1.8 mg.

Table S1. Adsorption isotherm parameters of lysozyme nanofibers with Reactive Black 5, Acid Blue 29 and Victoria Blue B.

Reactive Black 5

	Langmuir Isotherm		Freundlich Isotherm
q_{max} (mg g^{-1})	159.2	n	17.3
K_L (L mg^{-1})	10.5	K_F	129.0
R^2	0.9748	R^2	0.9331

Acid Blue 29

	Langmuir Isotherm		Freundlich Isotherm
q_{max} (mg g^{-1})	103.1	n	15.4
K_L (L mg^{-1})	4.8	K_F	81.2
R^2	0.9622	R^2	0.9144

Victoria Blue B

	Langmuir Isotherm		Freundlich Isotherm
q_{max} (mg g^{-1})	100.2	n	4.7
K_L (L mg^{-1})	0.48	K_F	46.6
R^2	0.9546	R^2	0.9925

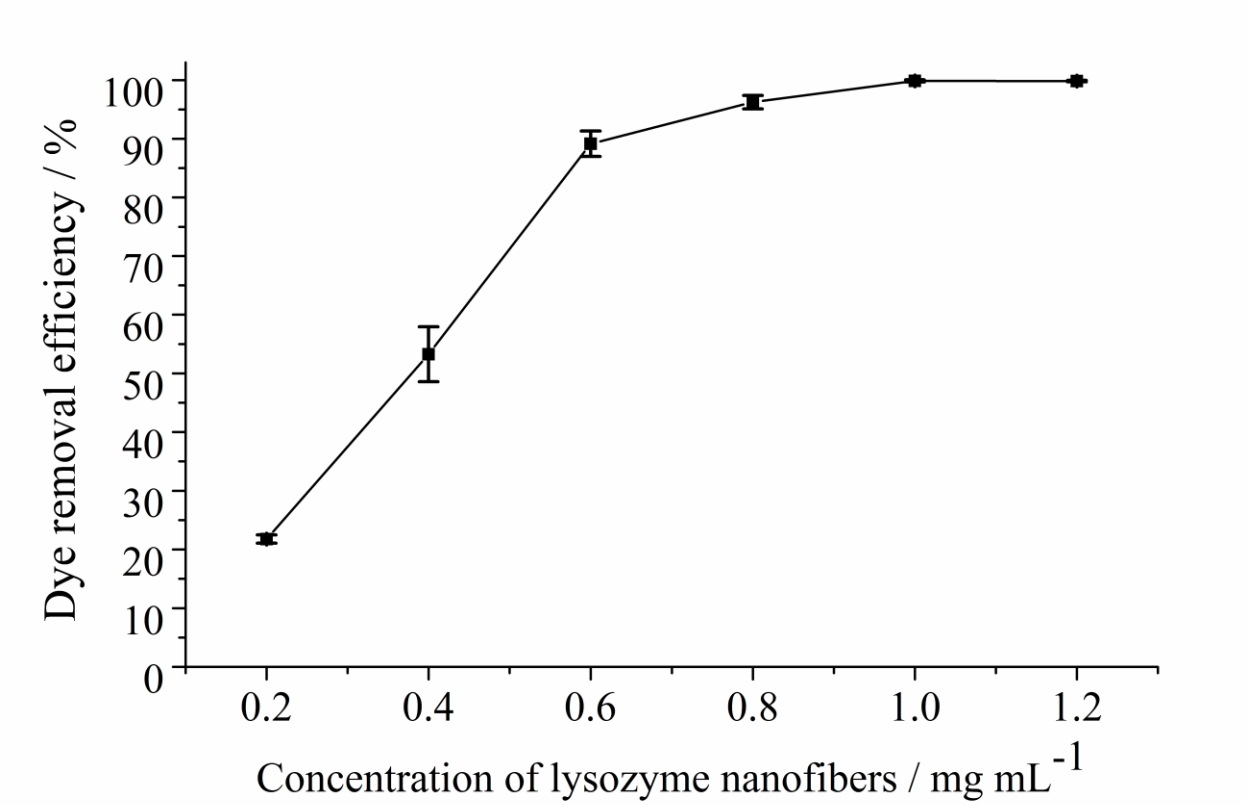


Figure S7. Removal efficiencies of Acid Blue 29 by different amounts of lysozyme nanofibers. Lysozyme nanofibers (final concentration = 0.2, 0.4, 0.6, 0.8, 1.0 and 1.2 mg mL^{-1}) were mixed in 3.0 mL of Acid Blue 29 solution [67 mg L^{-1} (109 μM) at pH 3.0]. Triplicate measurements were performed at each concentration of lysozyme nanofibers.

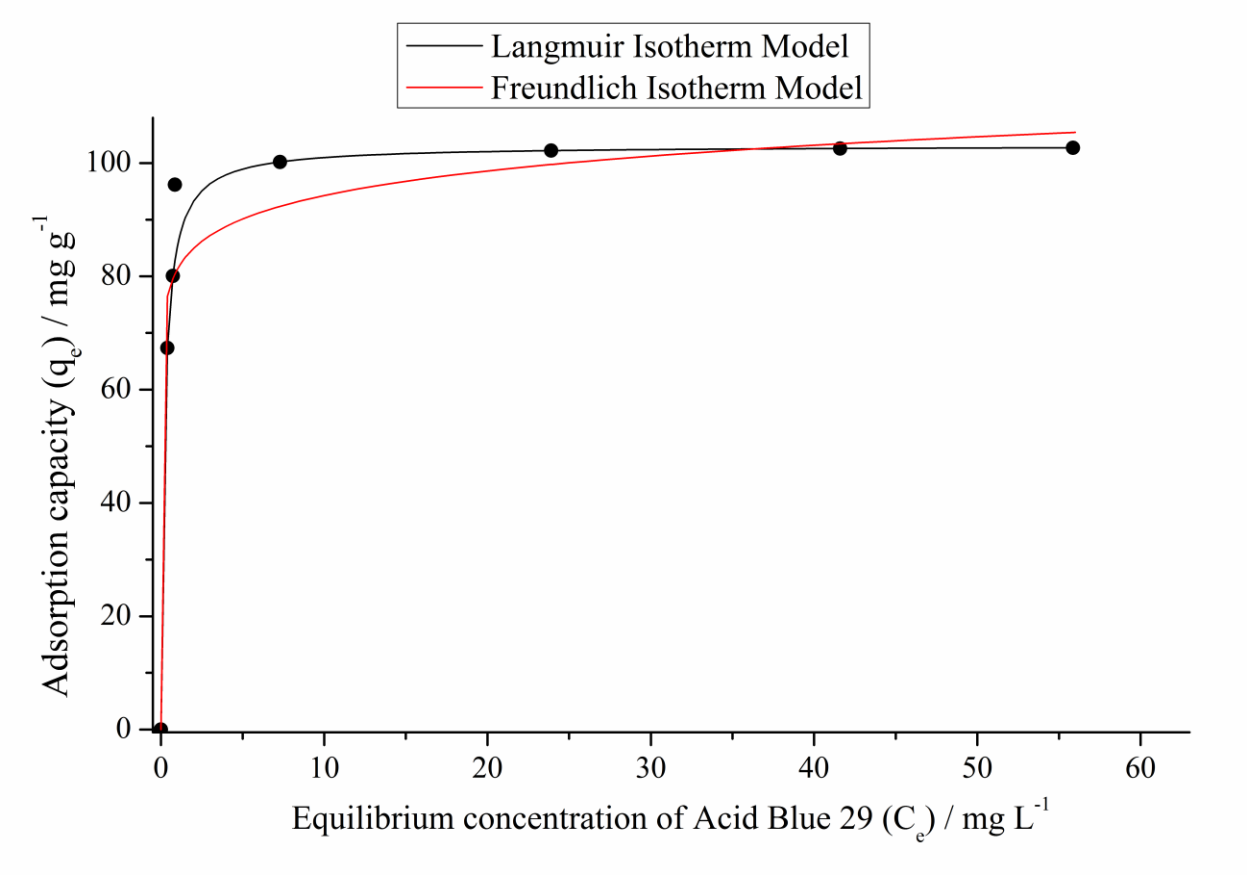


Figure S8. Adsorption isotherms of lysozyme nanofibers with Acid Blue 29. The black and red lines represent the Langmuir isotherm model and the Freundlich isotherm model, respectively. Adsorption conditions: initial concentrations of Acid Blue 29 = 0, 34, 51, 59, 67, 84, 101 and 118 mg L^{-1} (solution volume = 3.0 mL, pH 3.0); amount of lysozyme nanofibers in each solution = 1.8 mg.

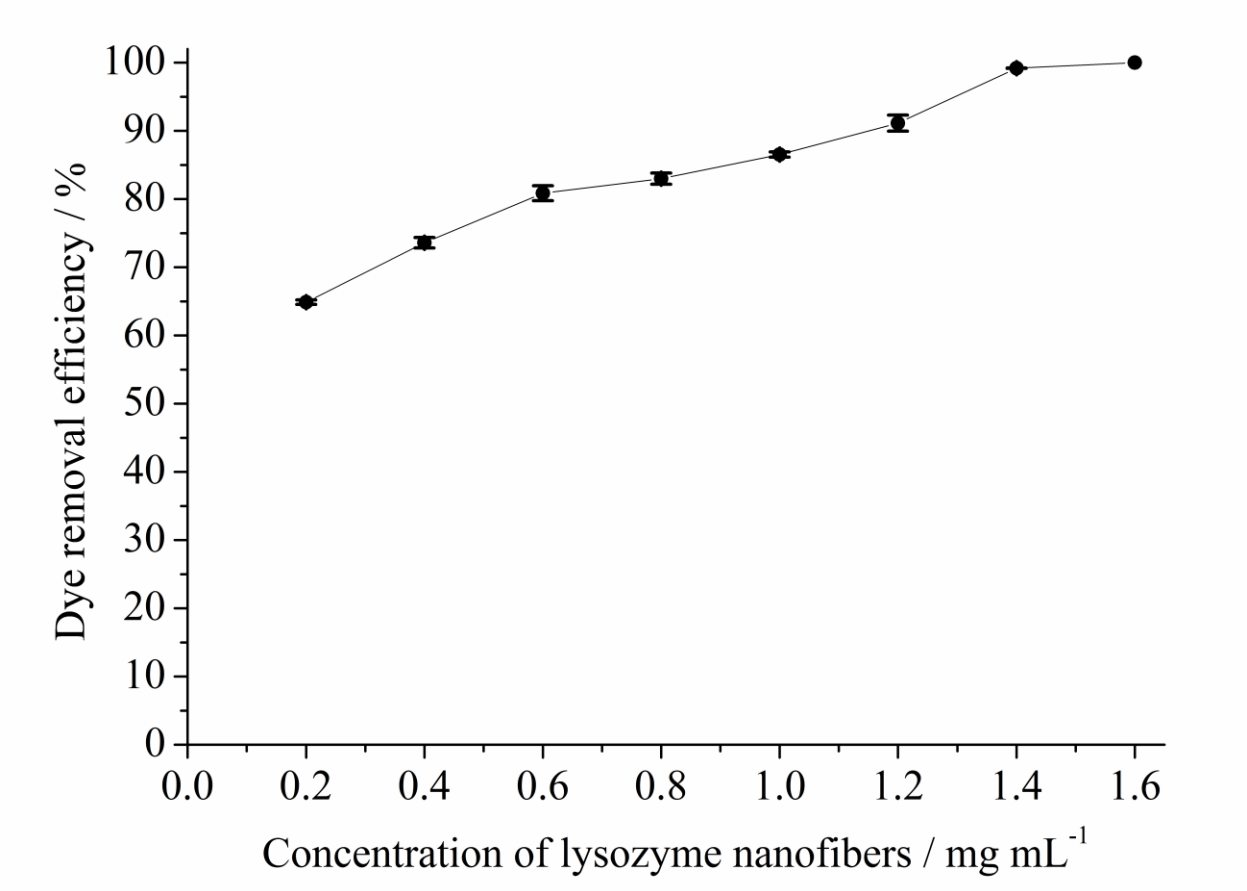


Figure S9. Removal efficiencies of Victoria Blue B by different amounts of lysozyme nanofibers. Lysozyme nanofibers (final concentration = 0.2, 0.4, 0.6, 0.8, 1.0, 1.2, 1.4 and 1.6 mg mL^{-1}) were mixed in 3.0 mL of Victoria Blue B solution [55 mg L^{-1} (109 μM) at pH 10.7]. Triplicate measurements were performed at each concentration of lysozyme nanofibers

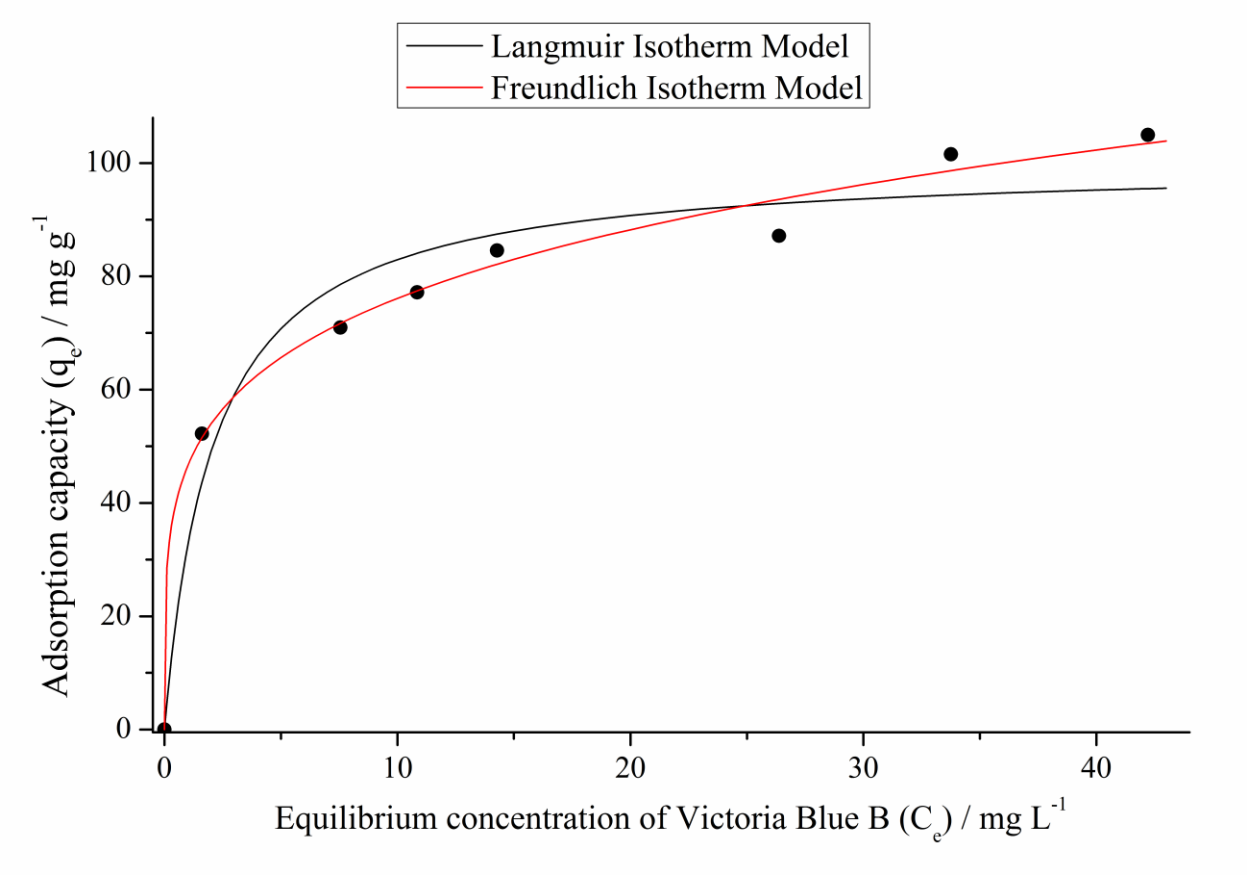


Figure S10. Adsorption isotherms of lysozyme nanofibers with Victoria Blue B. The black and red lines represent the Langmuir isotherm model and the Freundlich isotherm model, respectively. Adsorption conditions: initial concentrations of Victoria Blue B = 0, 28, 41, 48, 55, 69, 83 and 97 mg L^{-1} (solution volume = 3.0 mL, pH 10.7); amount of lysozyme nanofibers in each solution = 1.8 mg.

Table S2 Maximum adsorption capacities of various materials for Reactive Black 5, Acid Blue 29 and Victoria Blue B.

	Materials	**Dyes**	**q_{max} (mg g^{-1})**	**References**
1.	Activated carbon from *Prosopis juliflora* bark	Victoria Blue B	0.3693	M. Kumar and R. Tamilarasan, *Journal of Materials and Environmental Science*, 2014, **5**, 510-519.
2.	Activated carbon/Ba/alginate polymer	Victoria Blue B	3.214	M. Kumar, R. Tamilarasan and V. Sivakumar, *Carbohydrate Polymers*, 2013, **98**, 505-513.
3.	*Aspergillus niger*	Acid Blue 29	6.6	Y. Fu and T. Viraraghavan, *American Association of Textile Chemists and Colorists Review*, 2011, **1**, 36-40.
4.	*Penicillium restrictum*	Reactive Black 5	100.46	C. F. Iscen, I. Kiran and S. Ilhan, *Journal of Hazardous Materials*, 2007, **143**, 335-340.
5.	Acid-treated seaweed *Laminaria sp.*	Reactive Black 5	92.3	K. Vijayaraghavan and Y.-S. Yun, *Dyes and Pigments*, 2008, **76**, 726-732.
6.	*Aspergillus foetidus*	Reactive Black 5	92	R. Patel and S. Suresh, *Bioresource Technology*, 2008, **99**, 51-58.

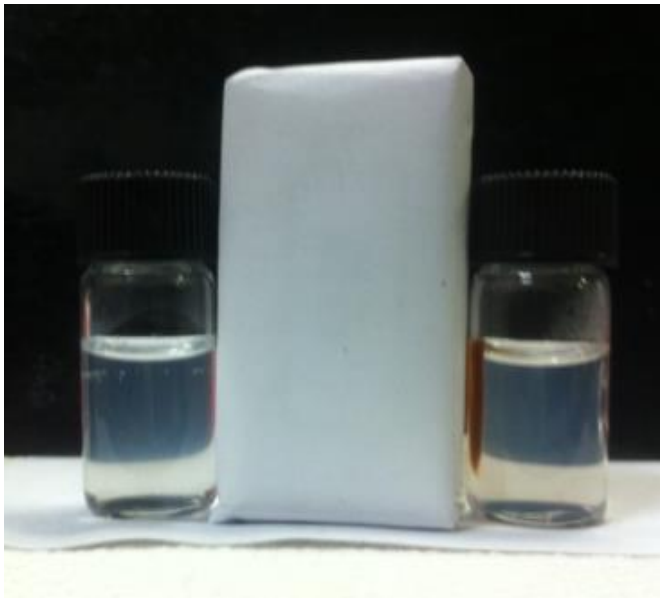


Figure S11. Effect of applying an external magnetic field on lysozyme nanofibers with and without magnetite. **(Left)**: lysozyme nanofibers without magnetite. **(Right)**: lysozyme nanofibers with magnetite; the magnetic lysozyme nanofibers are attracted towards the magnet (white block). Amount of lysozyme nanofibers = 1.8 mg.

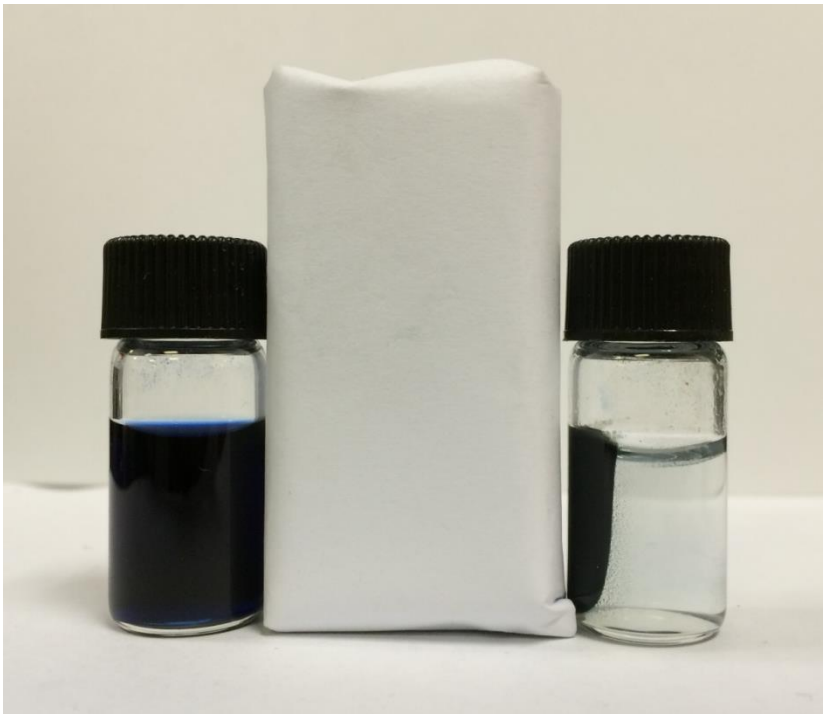


Figure S12. Adsorption behavior of magnetite-bound lysozyme nanofibers with Acid Blue 29. **(Left)**: Acid Blue 29 solution alone. **(Right)**: Acid Blue 29 solution mixed with magnetite-bound lysozyme nanofibers; the dye-adsorbed lysozyme nanofibers are attracted towards the magnet (white block). Solution conditions of Acid Blue 29: dye concentration = 67 mg L^{-1} (109 μM); volume = 3.0 mL; pH = 3.0. Amount of lysozyme nanofibers = 3.0 mg.

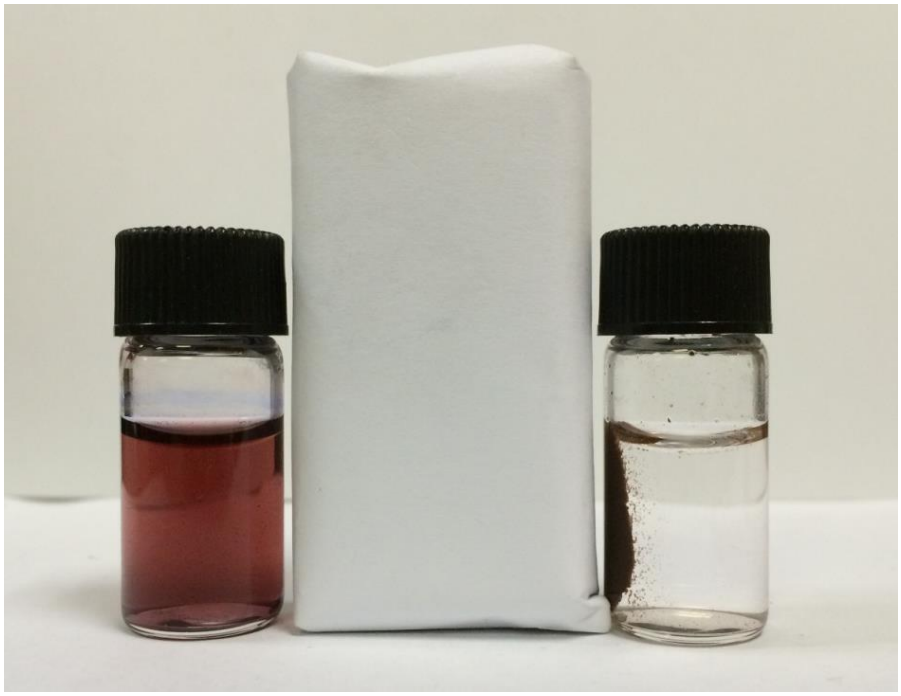


Figure S13. Adsorption behavior of magnetite-bound lysozyme nanofibers with Victoria Blue B. **(Left)**: Victoria Blue B solution alone. **(Right)**: Victoria Blue B solution mixed with magnetite-bound lysozyme nanofibers; the dye-adsorbed lysozyme nanofibers are attracted towards the magnet (white block). Solution conditions of Victoria Blue B: dye concentration = 55 mg L^{-1} (109 μM); volume = 3.0 mL; pH = 10.7. Amount of lysozyme nanofibers = 3.0 mg.

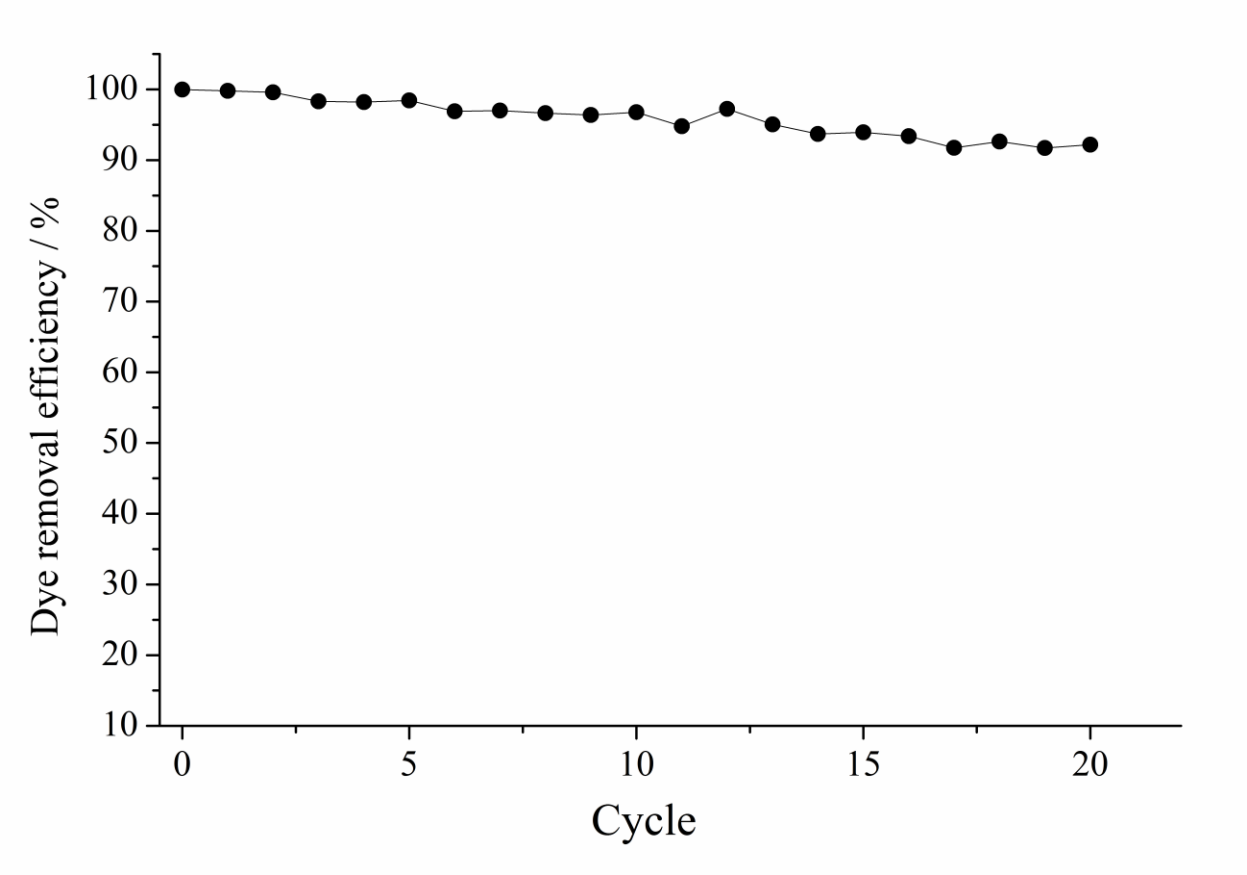


Figure S14. Dye removal efficiencies of magnetite-bound lysozyme nanofibers with Acid Blue 29 after desorptions. Lysozyme nanofibers (3.0 mg) were mixed with Acid Blue 29 solution [67 mg L^{-1} (109 μM), volume = 3.0 mL, pH 3.0], separated by an external magnet, desorbed by 3.0 mL of pH 11.0 solution, and then underwent adsorption with Acid Blue 29 [67 mg L^{-1} (109 μM), volume = 3.0 mL, pH 3.0]. Triplicate experiments were done for each adsorption/desorption cycle.

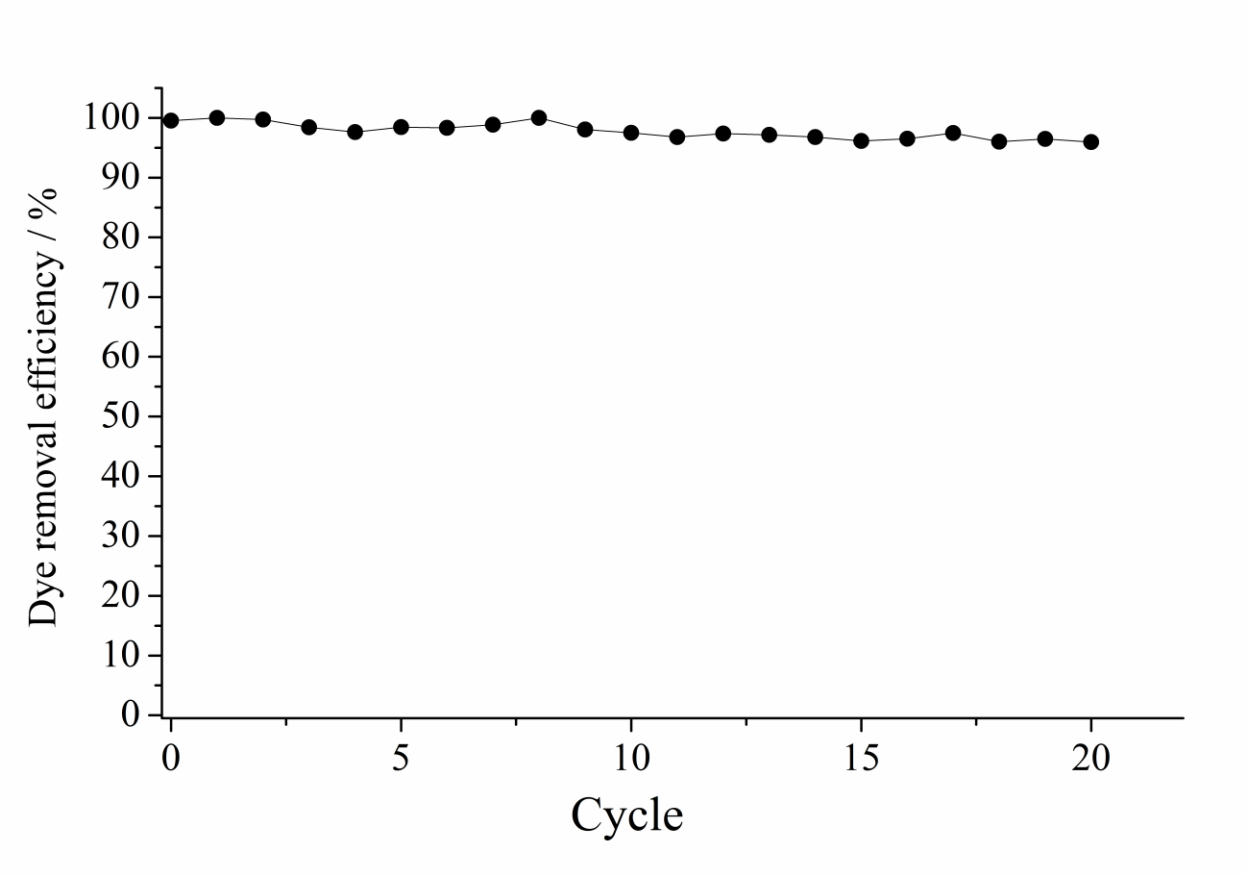


Figure S15. Dye removal efficiencies of magnetite-bound lysozyme nanofibers with Victoria Blue B after desorptions. Lysozyme nanofibers (3.0 mg) were mixed with Victoria Blue B solution [55 mg L^{-1} (109 μM), volume = 3.0 mL, pH 10.7], separated by an external magnet, desorbed by 3.0 mL of pH 5.0 solution, and then underwent adsorption with Victoria Blue B [55 mg L^{-1} (109 μM), volume = 3.0 mL, pH 10.7]. Triplicate experiments were done for each adsorption/desorption cycle.