Supplementary Information (SI) for RSC Advances.
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Electrospun ZIF-67/PVDF composite membranes for efficient ciprofloxacin removal from wastewater

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1. Adsorption thermodynamics and kinetics formulas

1.1 Adsorption isotherm and thermodynamics equations:

Langmuir Isotherm.

$$Q_e = \frac{Q_0 K_L C_e}{1 + K_L C_e} \#(S1)$$

$$R_L = \frac{1}{1 + K_L C_0} \#(S2)$$

Where, Q_e and C_e are for the equilibrium adsorption capacity and the remaining concentration of CIP in the equilibrium state, respectively; Q_0 represents the maximum theoretical adsorption capacity; K_L represent the constants of the Langmuir adsorption models, R_L represent the equilibrium parameter, C_0 represent the highest initial concentration.

Freundlich Isotherm.

$$Q_e = bC_e^{\left(\frac{1}{n}\right)} \#(S3)$$

where b is the adsorption capacity and 1/n is the adsorption intensity or surface heterogeneity.

The adsorption thermodynamics equations

$$\Delta G^0 = -RT \ln K_0 \#(S4)$$

$$\Delta G^0 = \Delta H^0 - T\Delta S^0 \#(S5)$$

Where ΔG^0, ΔH^0, and ΔS^0 are the free energy of adsorption, adsorption enthalpy and adsorption entropy respectively; R is the gas constant, T is the absolute temperature, K_0 is the thermodynamic equilibrium constant and calculated by plotting $\ln K_0$ ($K_0 = Q_e/C_e$) versus Ce and extrapolating C_e to zero.

1.2Adsorption kinetics equations

The equations for the pseudo-first-order (S6) and pseudo-second-order(S7) kinetics models:

$$\ln\left(Q_e - Q_t\right) = \ln Q_e - k_1 t \#(S6)$$

$$t/Q_t = 1/k_2 Q_e^2 + t/Q_e \#(S7)$$

Where Q_e and Q_t are the adsorption capacity at equilibrium and different time (t), respectively, t is the adsorption time, k_1 and k_2 are the pseudo-first-order kinetic and pseudo-second-order kinetic constants respectively.

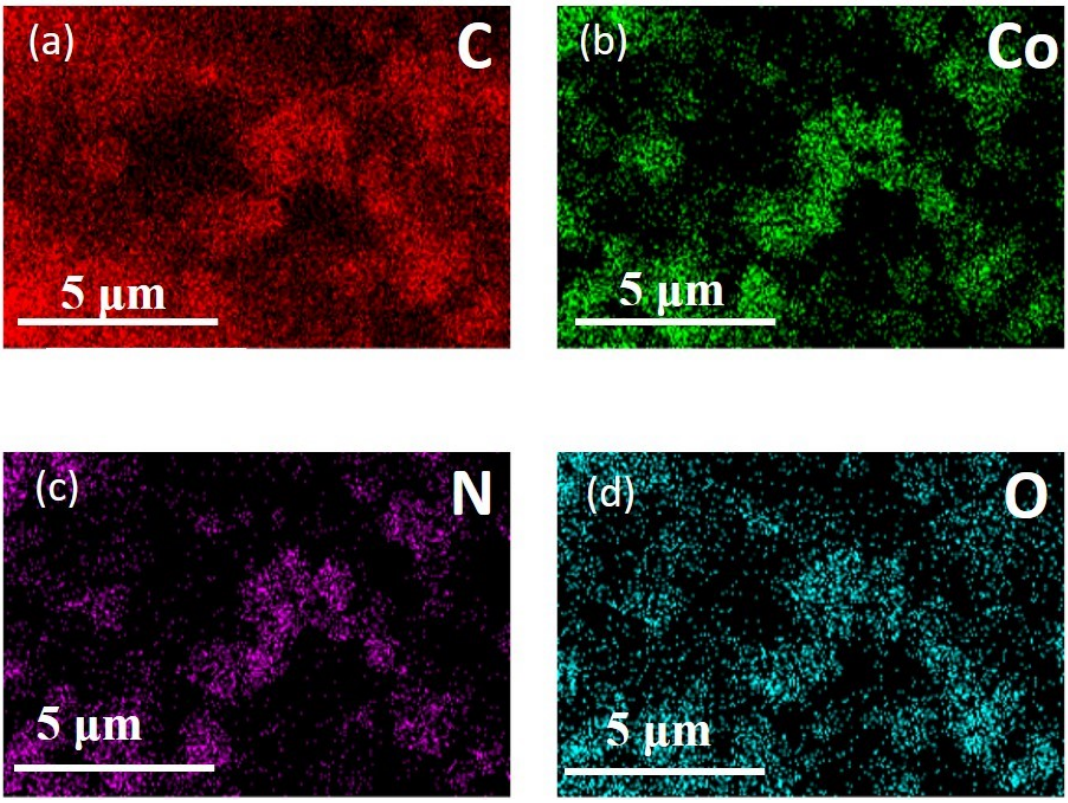

Fig. S1 EDS mappings of ZIF-67 (a-d)

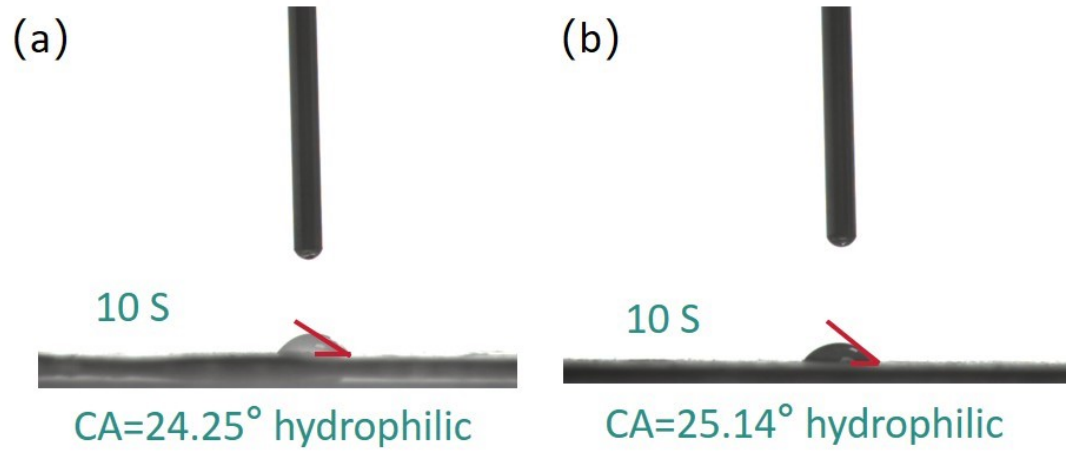

Fig. S2 Static contact angles of PVP/PVDF(a) and ZIF-67/PVDF nanofiber membranes(b)

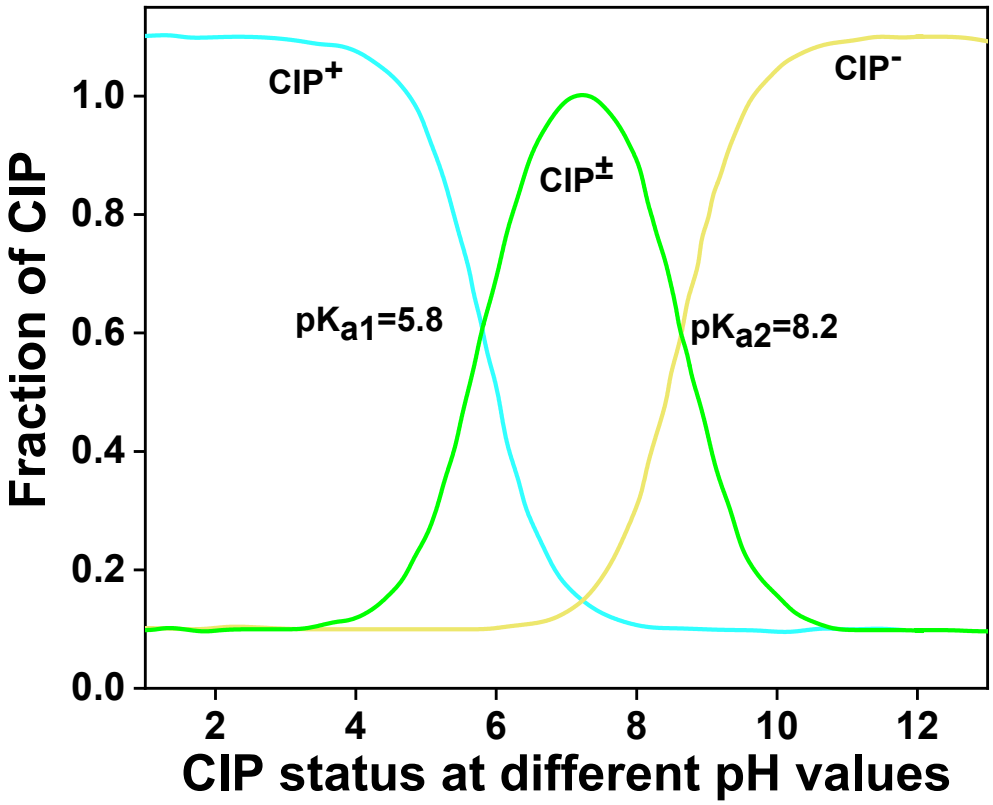

Fig. S3 CIP status at different pH values.

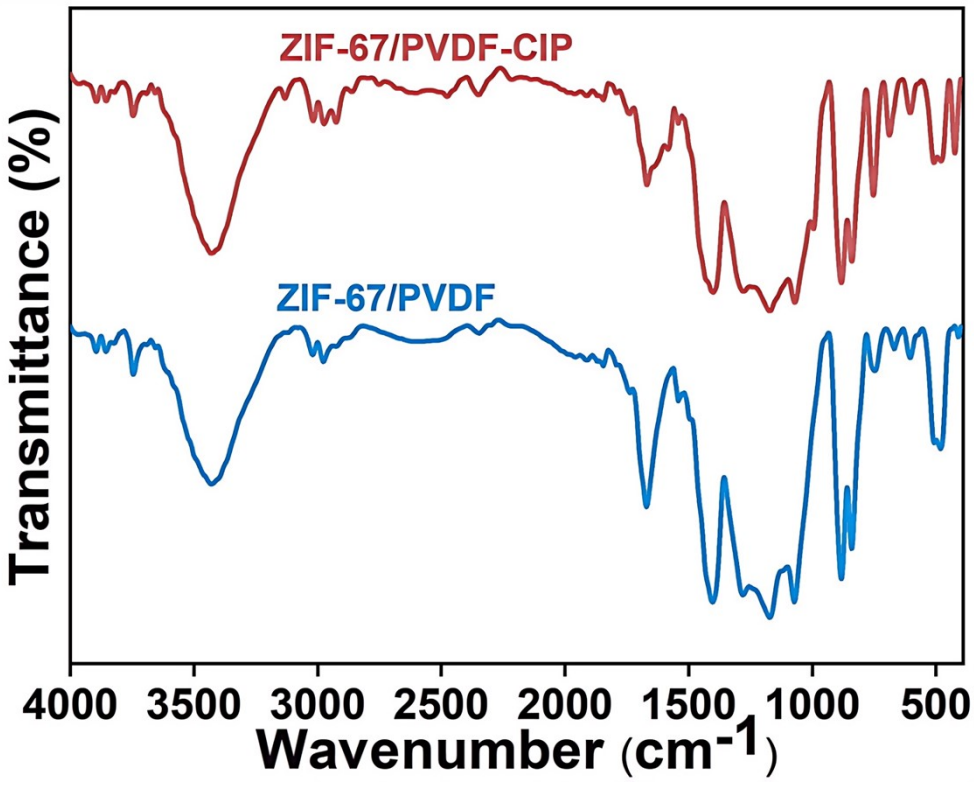

Fig. S4 FT-IR spectra for ZIF-67/PVDF before and after CIP adsorption.

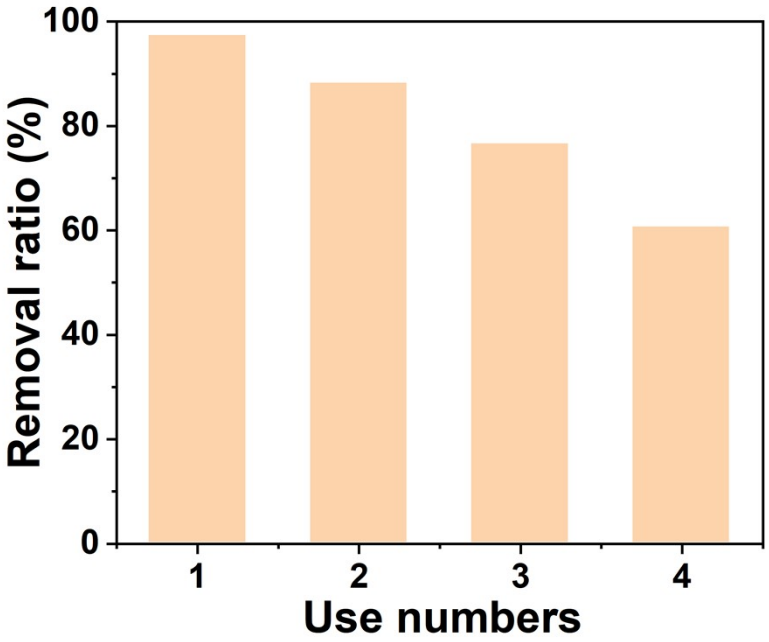

Fig. S5 Reusability of ZIF-67/PVDF for CIP adsorption.

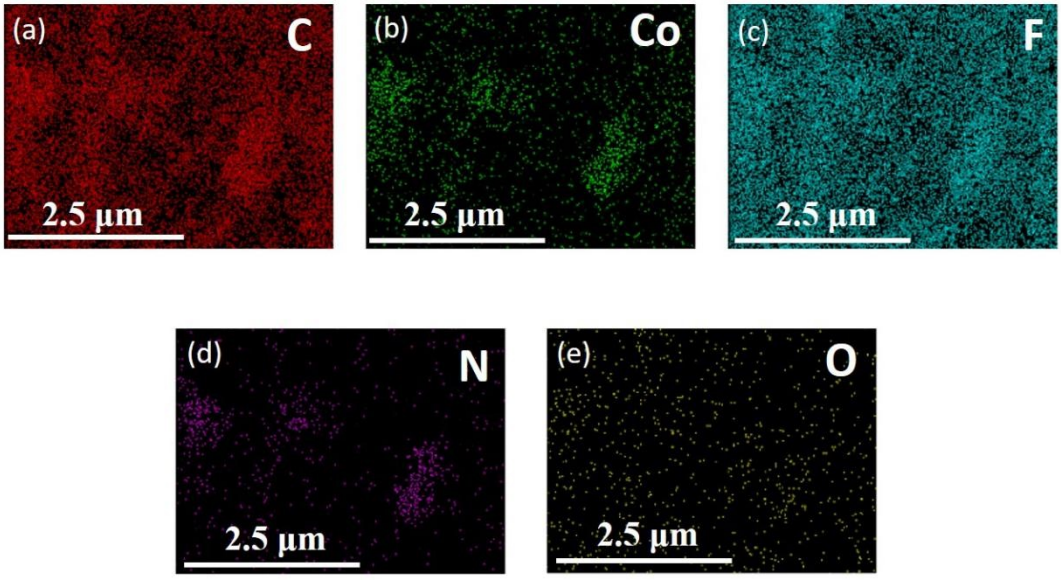

Fig. S6 EDS of ZIF-67/PVDF(a-e).