Supporting information

Modification with amidoxime group

UHMWPE fibers (about 1 g) were irradiated with ^{60}Co in air at room temperature and an absorbed dose rate of 1.18 kGy/h. The samples with an absorbed dose of 20 kGy were stored at -10℃ prior to radiation induced graft polymerization. The irradiated UHMWPE fibers were placed into a flask containing 5 vol % 4HB, 5 vol % AAc, 90 vol % water with additional 0.5 g span-20. After nitrogen was purged for 30 min, graft polymerization was performed for 6 h at 70℃. The samples were then washed by DMF and deionized water for three times, respectively. Subsequently, the modified fibers were noted as UHMWPE-*g*-P(AAc-*co*-4HB) after drying in a vacuum oven at 60℃. Eventually, the degree of grafting was 252% calculated by Eqn (S1):

$$Dg = (W_1 - W_0)/W_0 \times 100\% \quad \text{(S1)}$$

where W_1 and W_0 are the weights of samples after and before grafting, respectively. The UHMWPE-*g*-P(AAc-*co*-4HB) fibers were immersed with 50 vol % EDA, 50 vol % 1,4-dioxane at 75 °C for 4 h. The modified sample was washed three times with methanol and deionized water, respectively, to remove the residual EDA. After drying in a vacuum oven at 60℃ for 24 h, the obtained sample was noted as UHMWPE-*g*-P(AAc-*co*-4HB-EDA) fiber. UHMWPE-*g*-P(AAc-*co*-4HB-EDA) fiber was further modified with AN through Michael addition reaction in a solution containing 50 vol % AN, 50 vol % DMF at 40℃ for 5 h, with subsequent washing with DMF and water for three times, respectively. The obtained sample was coded as UHMWPE-*g*-P(AAc-*co*-4HB-EDA-AN). Finally, UHMWPE-*g*-P(AAc-*co*-4HB-EDA-AN) fibers were reacted with hydroxylamine in a 50/50 (v/v) % MeOH/H_2O solution containing 0.1 g/mL $NH_2OH{\cdot}HCl$ and 0.08 g/mL KOH for 12 h. Subsequently, the samples were removed from the solution and washed three times with deionized water. After drying in a in a vacuum oven at 60℃ for 24 h, the resultant sample was coded as AO fiber.

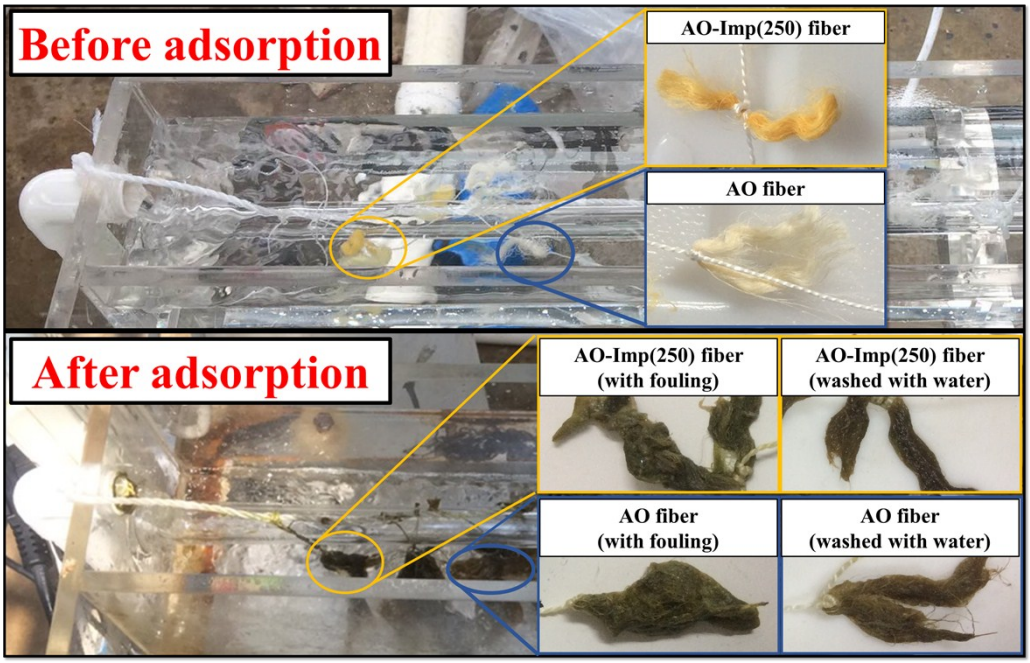

Fig. S1. Schematic diagrams of the marine adsorption flume

Table S1. Data of TGA and DTG of the pristine UHMWPE fiber and the modified fibers

Sample	T_{di} (℃)	T_{max} (℃)	Intensity
A	435	472	3.71
B	187	208/393/471	0.05/1.95/1.48
C	161	241/294/475	0.32/0.70/1.70
D	150	222/294/478	0.59/0.68/1.24
E	131	185/301/374/478	0.28/0.64/0.64/1.12
F	129	185/299/411/478	0.18/0.68/0.53/1.52

T_{di}: initial decomposition temperature; T_{max}: temperature of maximum decomposition rate

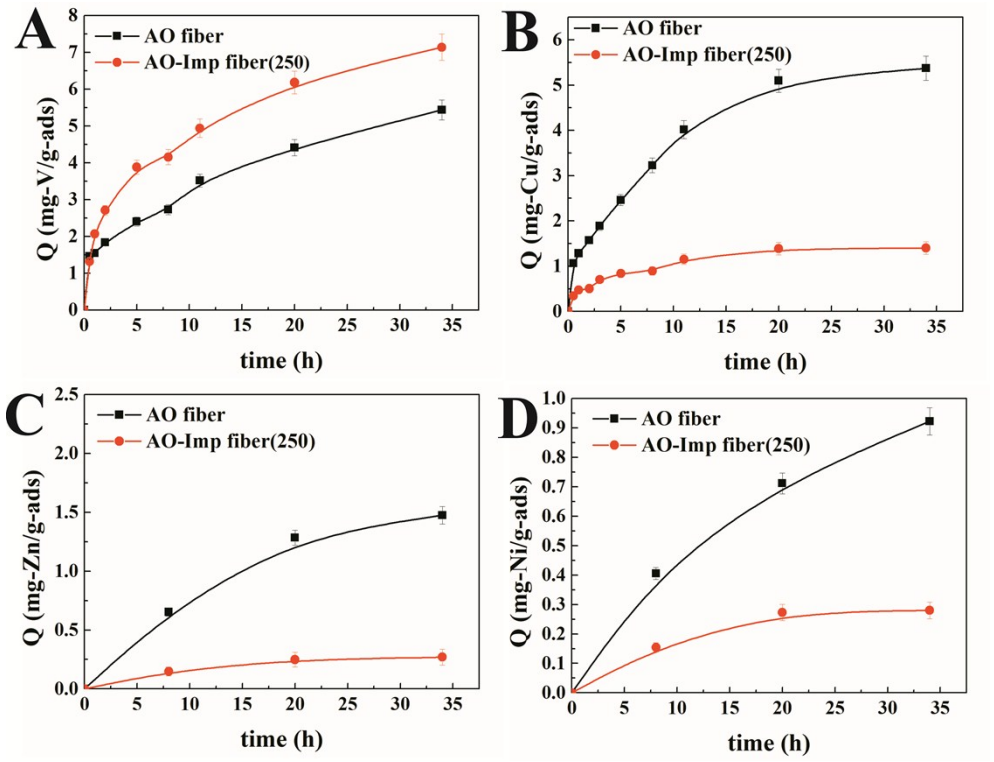

Fig. S2. The time-dependent curves of adsorption capacity for (A) vanadium, (B) copper, (C) zinc and (D) nickel ions, respectively

Table S2. The kinetic parameters of k and R^2 fitted by pseudo-first-order through the time-dependent curves of adsorption for vanadium, copper, zinc and nickel ions, respectively.

	Sample	Q_e, exp ($mg \cdot g^{-1}$)	Q_e, cal ($mg \cdot g^{-1}$)	k_1 (h^{-1})	R^2
V	**AO fiber**	5.44	4.49	0.07	0.9610
	AO-Imp(250) fiber	7.14	5.92	0.09	0.9704
Cu	**AO fiber**	5.37	5.28	0.14	0.9745
	AO-Imp(250) fiber	1.88	1.48	0.21	0.9228
Zn	**AO fiber**	1.47	3.03	0.10	0.9673
	AO-Imp(250) fiber	0.27	0.29	0.13	0.9807
Ni	**AO fiber**	0.93	0.92	0.08	0.9998
	AO-Imp(250) fiber	0.37	0.28	0.19	0.9205