Supporting Information

2 Estimation of Reactivity Ratio

The reactivity ratio of AN and *t*BA in ATRP on PE-*g*-PVBC fiber was estimated using a linear method described in M. Fineman and S. D. Ross, *Journal of Polymer Science*, 1950, **5**, 259-262 since the monomer conversion was low (Table S1, 1.8 -8.7 %). When M_1 and M_2 are defined as the monomer composition and m_1 and m_2 as the polymer composition, the following equation is derived from a conventional copolymerization equation.

$${}_{8} \frac{F}{f}(f-1) = r_1 \frac{F^2}{f} - r_2$$
(Eq. 1)

9 where $f = \frac{m_1}{m_2}$ and $F = \frac{M_1}{M_2}$. The parameters in Eq. 1 were tabulated and plotted in Table S1 and 10 Fig. S1, respectively. The linear fit with entire data points (A) gave a poor correlation whereas 11 the ones with samples 5-7 (B) or with samples 4-7 (C) gave a better fit. Since samples 2 and 3 12 contained smaller amount of P*t*BA, the elemental analysis might have more errors (e.g. content 13 of oxygen) for the determination of their graft-chain composition molar ratio. Due to its better 14 fit, the linear fit with samples 4-7 (C) was chosen to represent r_1 and r_2 values. The resulting r_1 15 and r_2 values are $r_{AN} = 1.61$ and $r_{tBA} = 0.88$.

								0	. –
Sample	Feed 1 rat	molar io	Graft compo mola	-chain osition r ratio	Monomer conversion	f	F (M/M)	F ² /f	(F/f)(f-1)
	AN	tBA	PAN	PtBA	(%)	(m_1/m_2)	$(\mathbf{W}_1/\mathbf{W}_2)$		
	(M ₁)	(M ₂)	(m ₁)	(m ₂)					
1	1.00	0.00	1.00	0.00	3.6				
2	0.91	0.09	0.95	0.05	8.7	21.04	10.00	4.75	9.52
3	0.83	0.17	0.92	0.08	5.1	11.80	5.00	2.12	4.58
4	0.69	0.31	0.77	0.23	2.2	3.35	2.26	1.52	1.58
5	0.58	0.42	0.66	0.34	4.3	1.90	1.36	0.97	0.64
6	0.51	0.49	0.60	0.40	1.8	1.48	1.05	0.75	0.34

¹⁶ Table S1 Parameters for the reactivity ratio determination upon AN and *t*BA on PE-g-PVBC



value as a function of \overline{f} and their linear fit: (A) with entire data points, (B) with samples 5-7, (C) with samples 4-7.



Table S2 Typical Seawater Ion Concentrations (from ref 2, J. Kim, C. Tsouris, R. T. Mayes, Y.

Oyola, T. Saito, C. J. Janke, S. Dai, E. Schneider and D. Sachde, Separation Science and Technology, 2013, 48, 367-387)

Element	Typical total seawater concentration
	(µg/kg)
Cl	1.91×10 ⁷
Na	1.08×10^{7}
Mg	1.33×10^{6}
Ca	4.22×10^{5}
Κ	3.80×10 ⁵
Li	170
Zn	4
U	3-3.3
Al	2
Fe	1-2
Ni	0.5-1.7
V	1.5
Ti	1
Cu	0.6
Mn	0.25
Co	0.05
Pb	0.03

ble S2 Seawater Ion Concentrations (Low Concentration Ions) at Sequim Bay						
Element	Filtered Sequim	Filtered ambient seawater concentration in test system				
	Bay seawater					
	(ng/kg)	(ng/kg)				
V	1500	1480				
U	2850	2840				
Cu	190	540				
Ni	320	560				
Zn	285	2100				
Cr	135	180				
Pb	3	25				
Со	0.02	0.01				

39