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Supporting Information for:

Polyvinylamine modified polyester fibers - innovative textiles for the removal of chromate from contaminated ground waters

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Analytics

ICP and chromate analytics was performed by the DTNW Öffentliche Prüfstelle GmbH, a DAkkS and Oeko-Tex Standard 100/200 certified lab. Chromate measurement were performed in accordance with DIN EN ISO 11885. The limit of detection is 40 µg L^{-1}, with a reproducibility of ± 3 %.

Kjeldahl analytics: The limit of detection is 10 µmol g^{-1} with a reproducibility of ± 5 % for standard samples. In case of an textile the reproducibility is ± 15 %.

SEM Images

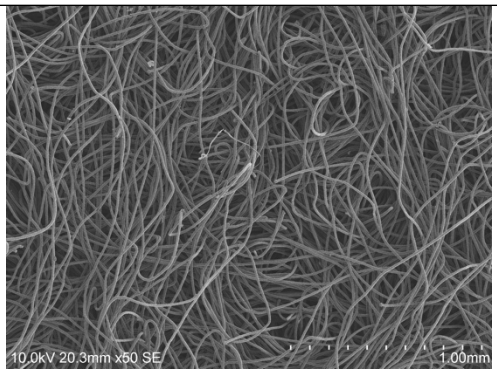
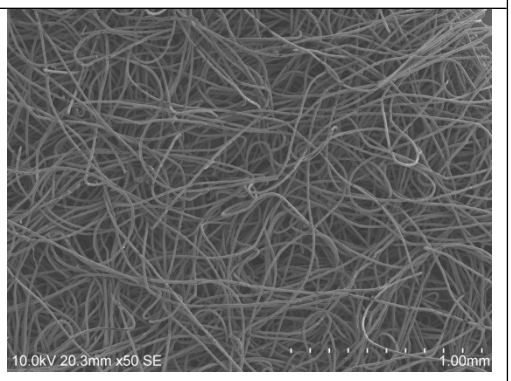
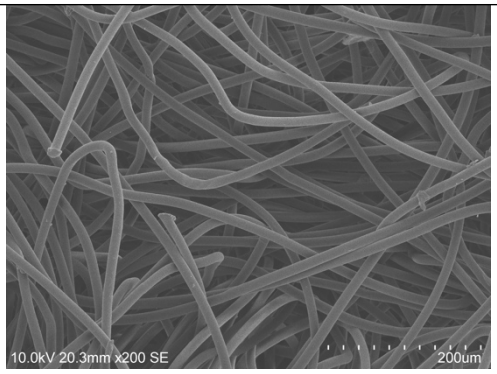
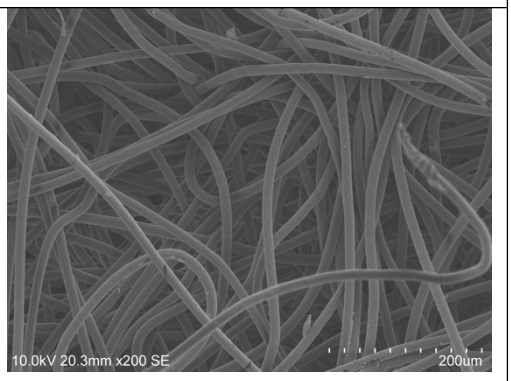
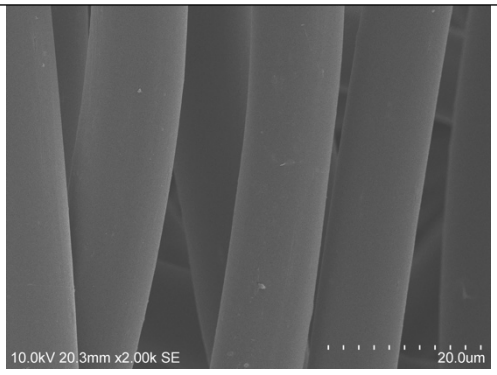
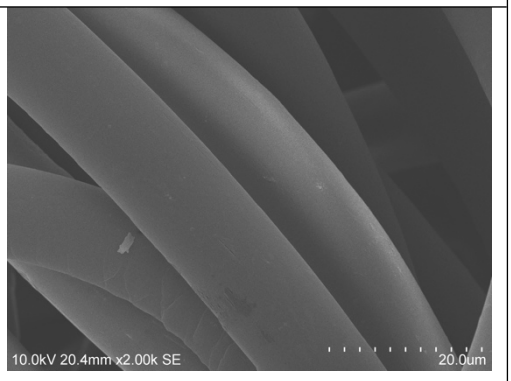
Resolution	Blind Fabric	PVAm finisched
		pH 3
		0.6 %
50 x		
200 x		
2000 x		

Figure S1.a SEM images of different PVAm modified PET fabrics.

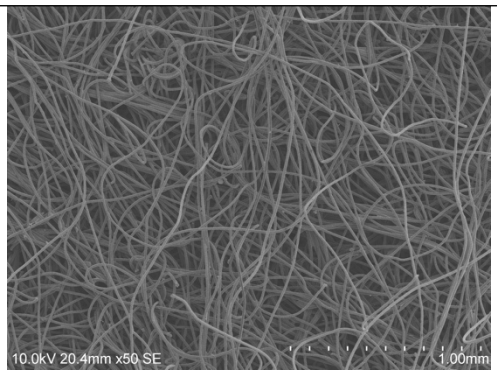
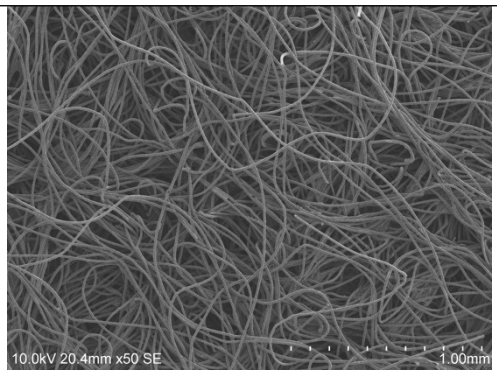
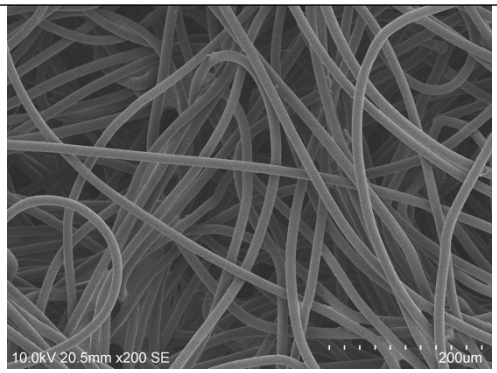
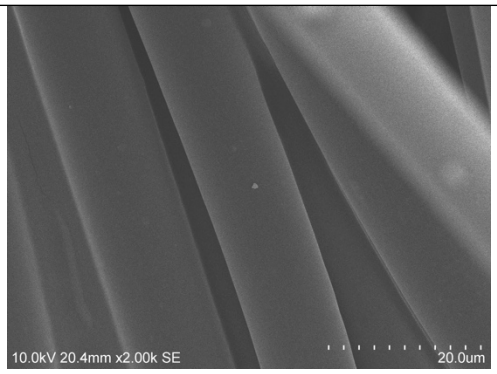
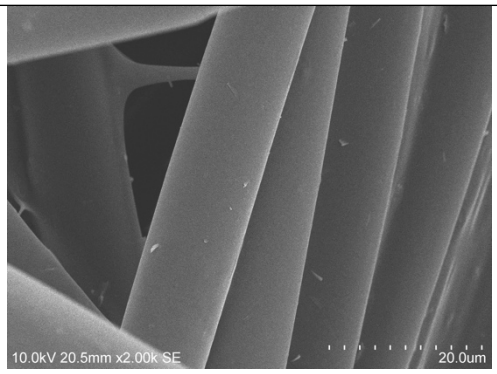
Resolution	PVAm finisched	PVAm finisched
	pH 7	pH 11
	6.2 %	4.0 %
50 x		
200 x		
2000 x		

Figure S1.b SEM images of different PVAm modified PET fabrics.

R_L values in a pH-range from 3, 5 to 7.

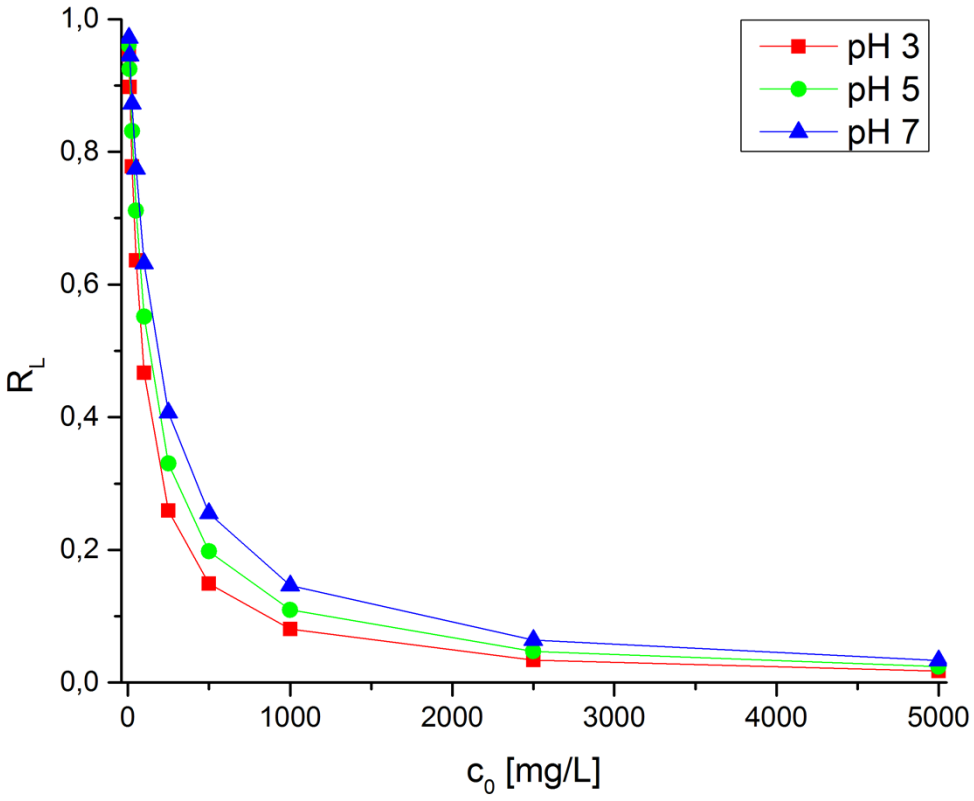


Figure S2. Separation factor R_L calculated from the Langmuir constantat different pH values.

Analysis of real-life ground-water samples

Table S1. Real-life ground water samples, results of pH, TOC, TN_b and ICP analysis

Blind		Breakthrough measurement run#			
		1	1	2	2
		10 min	55 min	10 min	45 min
Parameter	[mg L^{-1}]	[mg L^{-1}]	[mg L^{-1}]	[mg L^{-1}]	[mg L^{-1}]
Cr	56.613	0.033	1.130	0.026	10.701
Ca	61.20	60.921	61.820	60.710	60.903
Mg	161.90	2.535	6.184	1.083	6.217
Mn	0.35	0.143	0.355	0.008	0.237
Cu	0.19	0.121	0.154	0.130	0.170
Fe	1.12	0.912	0.984	1.031	1.080
TOC	95.4 ± 5.9	98.7	92.5	92.3	97.1
TN_b	4.33 ± 0.5	4.53	4.03	3.98	4.71
pH	7.7	-	-	-	-

Table S2. Chromate concentration after 10 min and after breakthrough

Run	10 min	Breakthrough
	[mg L^{-1}]	[mg L^{-1}]
1	0,033	1,133
2	0,026	10,702
3	0,020	9,182
4	0,047	11,400
5	1,28*	13,403
6	0,050	3,601
7	0,044	4,310
8	0,025	1,871

*Sample take at 17 min.

Breakthrough Measurement

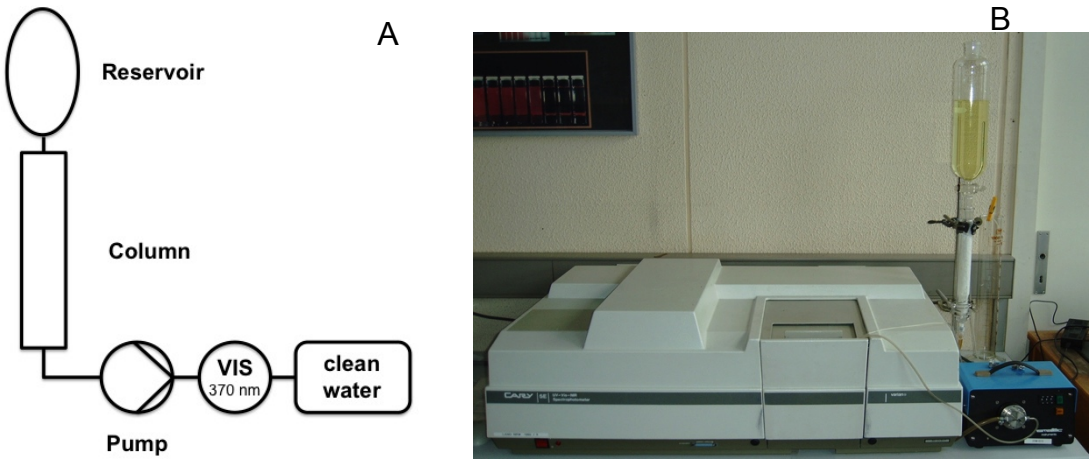


Figure S3. A. Scheme of the measuremetn set-up for the breakthrough curves and B. measurement equipment

PVAm leaching

Two different methods were used one to prevent leaching and the other to measure leaching during application. Leaching was prevented by the extraction, the samples were extracted until a constant weight was reached. Typically this was achieved after 8 h, as safety margin the triple extraction time (24 h) was chosen (2.1). Furthermore three samples finished with PVAm at pH 11 of 10 × 10 cm ≈ 1 g where extracted in a soxleth-extractor with water for five days to investigate, if a long time exposure to hot water, reduces the amount of bound PVAm. No change of the weight was observed within an uncertainty of ± 2.5 % and no change of the nitrogen content was ovserved, within the standard deviation reported in Table 1. Leaching during application was measured in the breakthrough experiments, after 10 minutes and after the breakthrough was reached. The change of the Total Organic Carbon (TOC) and Total Nitrogen (TN_b) was measured with a Hach-Lange TOC cuvette test LCK 386 (30-300 mg L^{-1}, < 10 %) and TN_b by Hach-Lange LATON cuvette test LCK 138 (1-16 mg L^{-1}, ± 5 %). No change of TOC/TN_b was observed. All measurements were done as a triple determination.

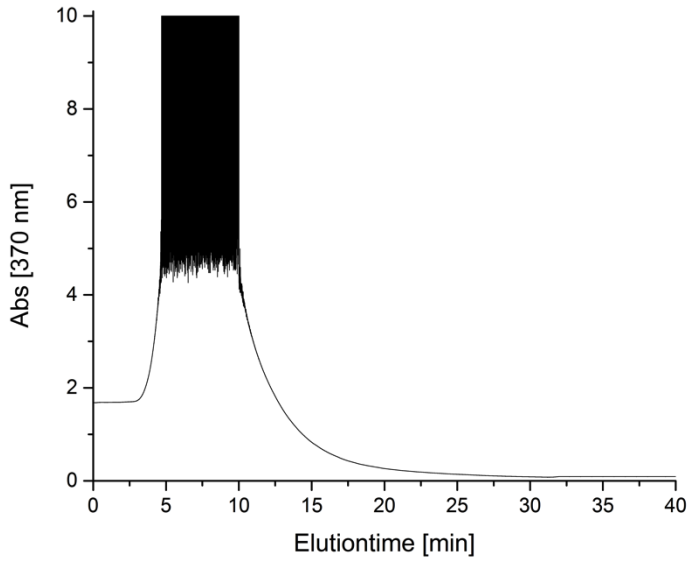


Figure S4. Elution measurement of a chromate containing 0.1 mol/L NaOH. Flow rate 3.5 ml/min, 100 ml are were eluted after approximately 30 min.

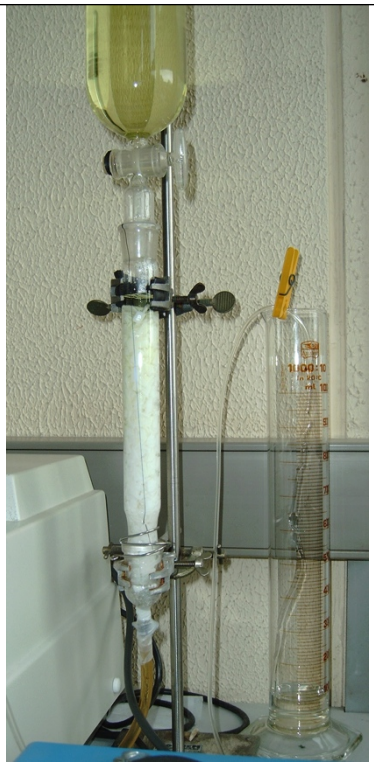
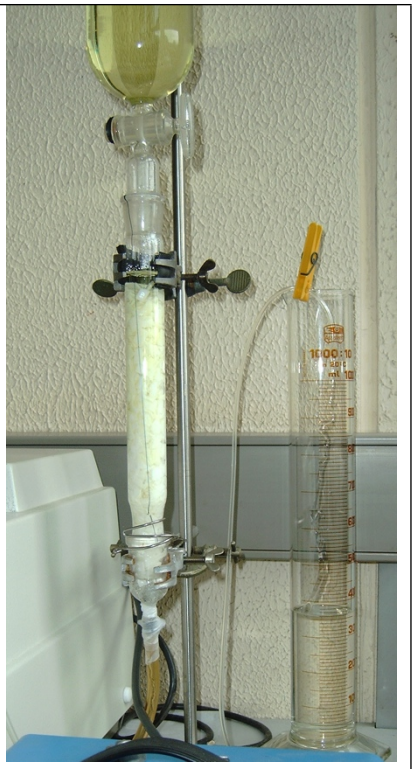
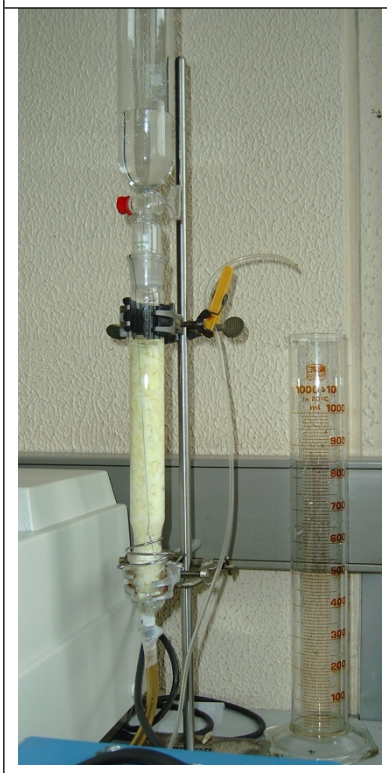
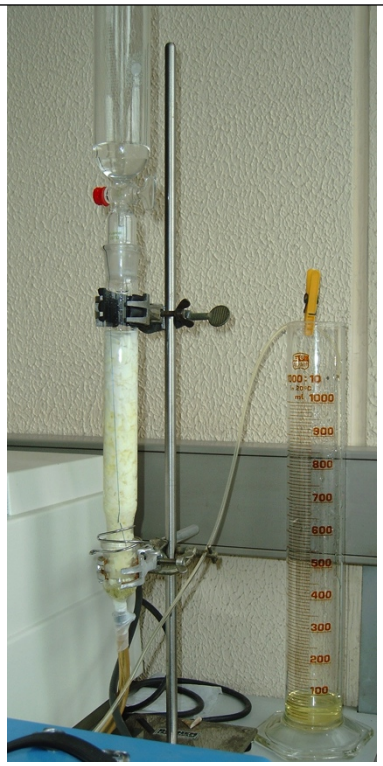
		
Before run	During adsorption	After breakthrough
		
Before desorption	During desorption with NaOH	After desorption, before next run

Figure S5. Column at different stages of the measurement and regeneration