Electronic supplementary information:

Adsorptive dead-end filtration for removal of Cr(VI) using novel amine modified polyacrylonitrile ultrafiltration membranes

Table S1: Studies on removal of Cr(VI) with adsorptive UF membranes

Membrane	Method	Reference
Hydrolyzed PAN UF membrane	Ultrafiltration membrane for effective removal of chromium ions from potable water	[1]
Electically conductive UF membrane	Electrochemical removal of Cr(VI) by electrically conducting UF membranes	[2]
Functionalized UF membranes	Removal of chromium ions by functional polymers in conjunction with ultrafiltration membranes	[3]
PVA grafted to PAN membrane	Positively nanofibrous composite microfiltration membranes for removal of heavy metal ions	[4]
Amine-functionalized MCM-41 membrane	Application of amine-functionalized MCM-41 modified UF membrane to remove Cr(VI)	[5]
ElectrospinnQuaternary amines on PAN membrane	Electrospun Weak Anion-Exchange Fibrous Membranes for Protein Purification	[6]

Table S2: Zeta potential of the pristine (PAN) and modified membranes (PAN-NH and PAN-Q) at pH 5.5, 7.0 and 8.5 used in the Cr(VI) adsorption experiments.

Zeta potential at pH [mV]	5.5	7.0	8.5
PAN	-32.9 ± 0.1	-34.4 ± 0.1	-35.4 ± 0.4
PAN-NH	+9.7 ± 0.2	+2.4 ± 0.2	-4.1 ± 0.6
PAN-Q	+8.6 ±0.2	+9.1 ± 0.1	+14.5 ± 1.0

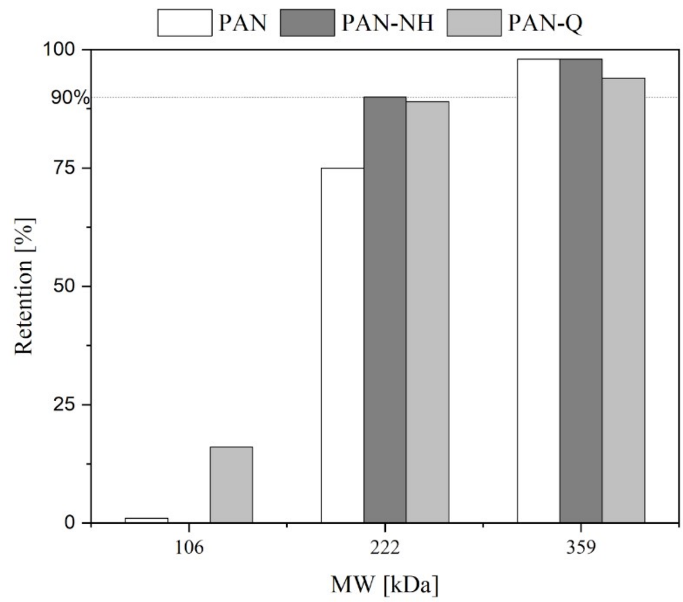

Figure S1: Determination of the MWCO of the PAN, PAN-NH and PAN-Q Membrane by measuring of the retention of different molecular weight standards. Filtration experiments were carried out in stirred dead-end cell with stirring speed of 300 rpm.

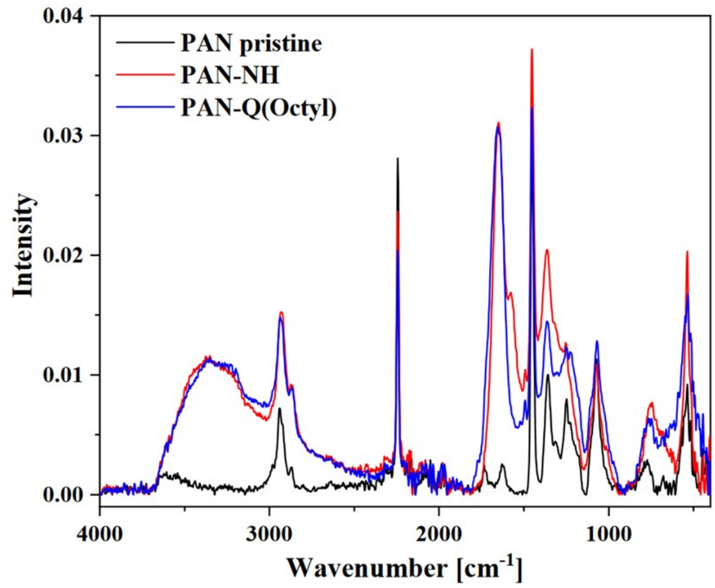

Figure S2: ATR-FTIR spectra of the pristine (black) membranes as well as the membranes modified with the primary amine (red) and the quaternary amine (blue).

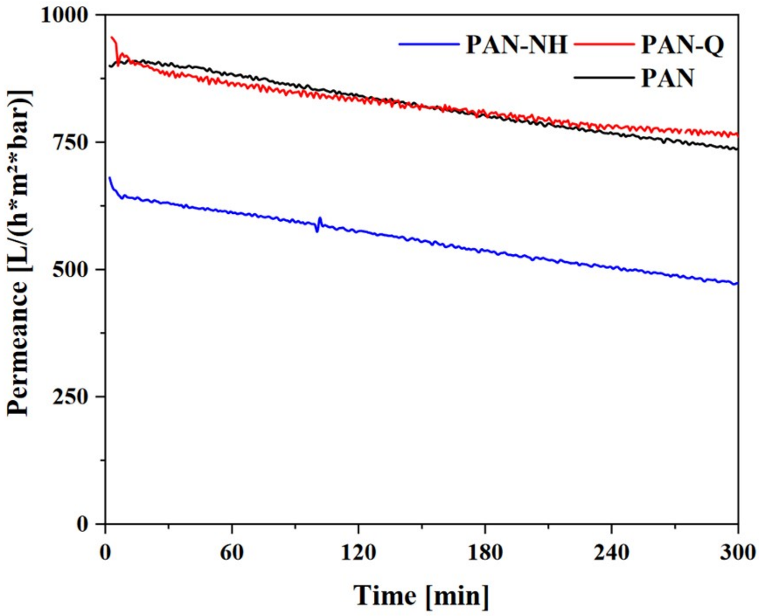

Figure S3: Water permeability of the pristine (black) and modified (red and blue) membranes over time.

Table S3: BET Surface of PAN membranes

Modification	BET surface [m²/g]	Slope [g/mmol]	y-intercept [g/mmol]	C [-]	Q_m [mmol/g]	Correlation coefficient
PAN	**13.07 ± 0.18**	**7.43 ± 0.10**	**0.034 ± 0.005**	**215.1**	**0.134**	**0.9998**
PAN-NH	14.35 ± 0.09	6.76 ± 0.04	0.044 ± 0.003	156.0	0.147	0.9999
PAN-Q	13.23 ± 0.03	0.32 ± 0.01	0.007± 0.001	48.3	0.136	0.999

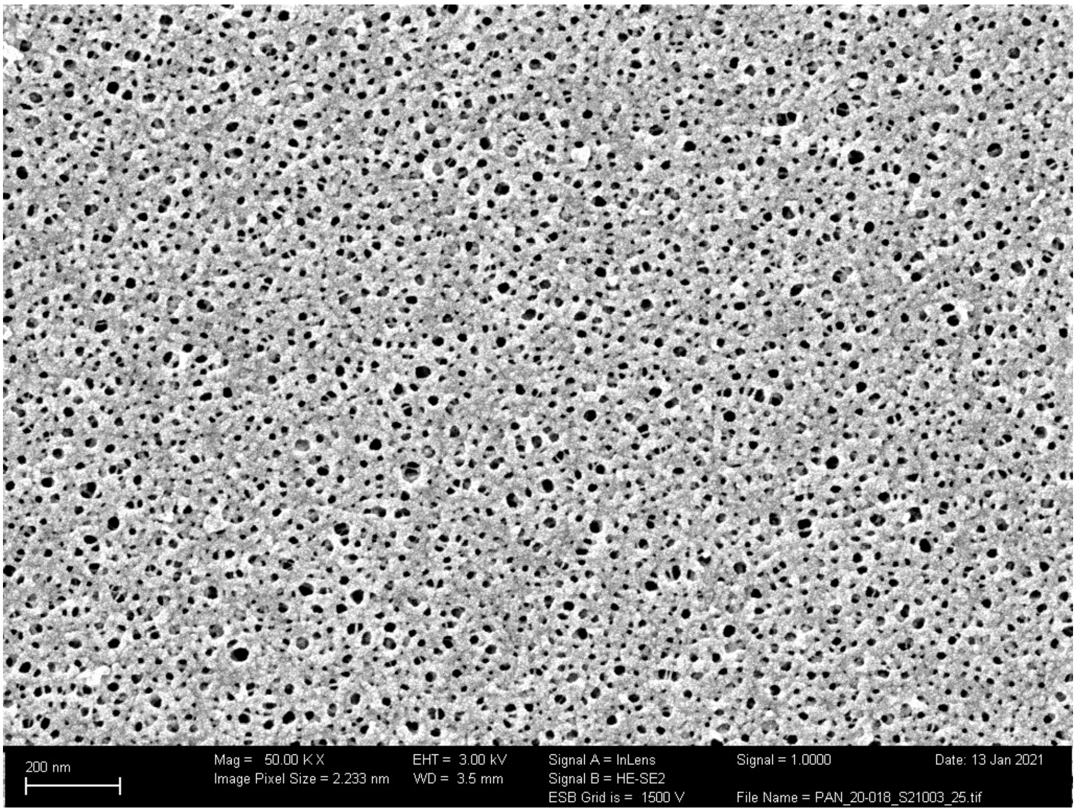

Figure S4: SEM figures of the active layer of the pristine PAN membrane

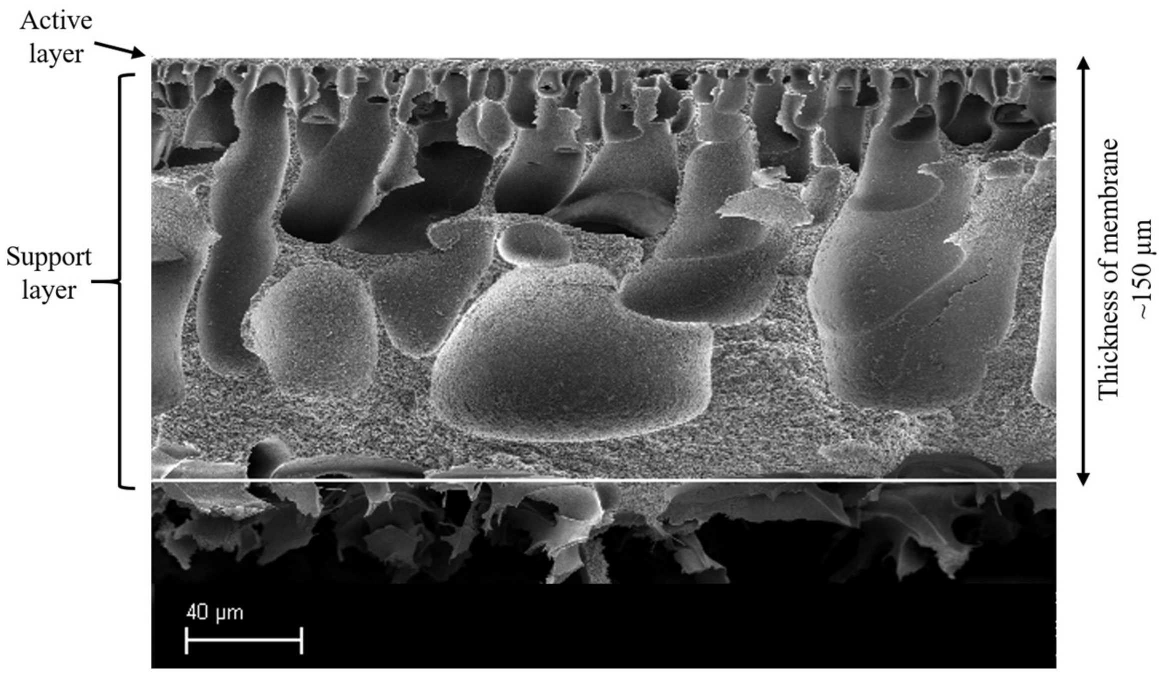

Figure S5: SEM figures of the cross-section of the pristine PAN membrane

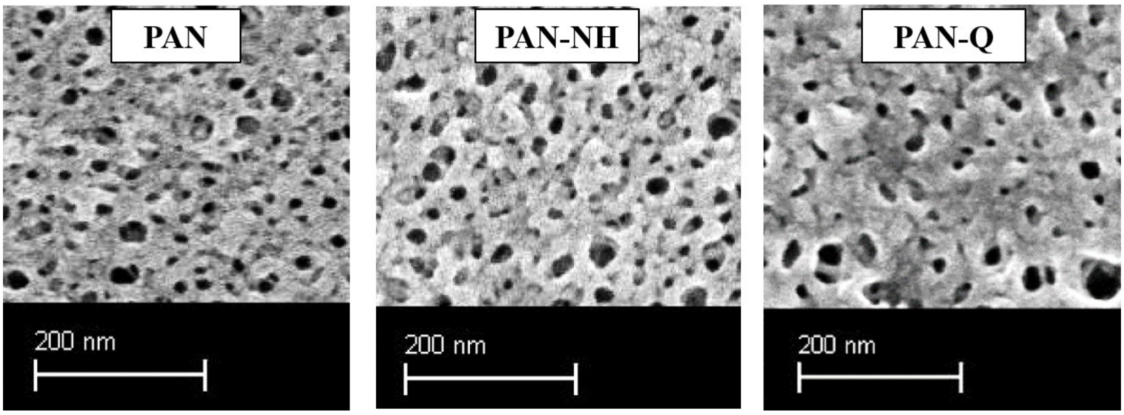

Figure S6: SEM figures of the active layer of pristine PAN, PAN-NH and PAN-Q membrane (batch 2).

References

[1] M.R. Muthumareeswaran, M. Alhoshan, G.P. Agarwal, Ultrafiltration membrane for effective removal of chromium ions from potable water, Sci. Rep. 7 (2017) 41423. https://doi.org/10.1038/srep41423.

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[6] S.-T. Chen, S.R. Wickramasinghe, X. Qian, Electrospun Weak Anion-exchange Fibrous Membranes for Protein Purification, Membranes (Basel) 10 (2020). https://doi.org/10.3390/membranes10030039.