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Addition/Correction

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Correction to "Microstructure Determines Water and Salt Permeation in Commercial Ion-Exchange Membranes"

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The authors regret that there was an error in the calculation of the Flory−Huggins interaction parameter χ (eq S15). This error caused the values of water diffusion coefficient (D_w) and permeability (P_w) calculated via eq 11 and eq 12, respectively, to be overestimated by 11−32%. The equations shown in the original manuscript were correct; however, the numerical values of χ, P_w, and D_w were incorrect. After correcting the error, P_w and D_w both decreased by the same amount for any given membrane (e.g., both quantities decreased by 11% for one of the membranes; both decreased by 32% for another membrane). Results for all other parameters we reported (D_s, P_s, K_w, K_s, A, B, ϕ_w, ξ, ion-exchange capacity, thickness, C_{fix}) were not affected by this error in the χ parameter.

We present below corrected tables and numerical values in the text. We also present corrected figures, though differences from the original figures are hard to discern because of the relatively small magnitude of changes in numerical values compared to the axis scales. The authors emphasize that the corrected values do not change the discussion or conclusions drawn in the manuscript. Among the membranes we studied, P_w and D_w each varied by approximately 1 order of magnitude; thus, a decrease of 11−32% in both variables does not meaningfully alter the relationships between P_w, D_w, and the other quantities we examined. Specifically, permeability and diffusion coefficients for water are still well correlated with those for salt (R^2 = 0.86 and 0.50, respectively, with $p < 0.01$), and the slopes of the linear regression lines (2.73 and 2.02, respectively) are still consistent with expectations based on free volume theory, as discussed in the text.

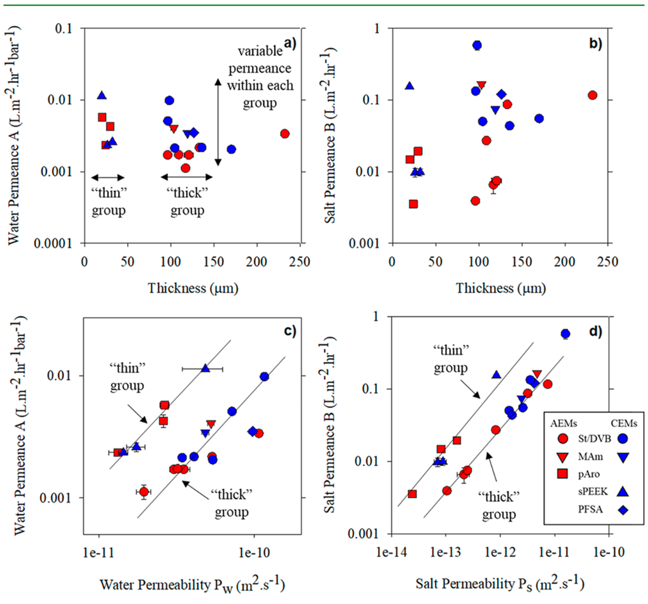

Figure 4. Water and salt permeance of 20 commercial IEMs measured in 4 M NaCl and pure water vs membrane thickness L (a,b) and permeability P (c, d). The lines in panels (c,d) are drawn to guide the eye. The red symbols denote AEMs, the blue symbols denote CEMs, and the shape of the symbol indicates the membrane polymer type [see legend in the inset of panel (d)]. The error bars represent the propagated standard error of at least three replicates. Refer to Table 1 for definitions of the membrane polymer abbreviations.

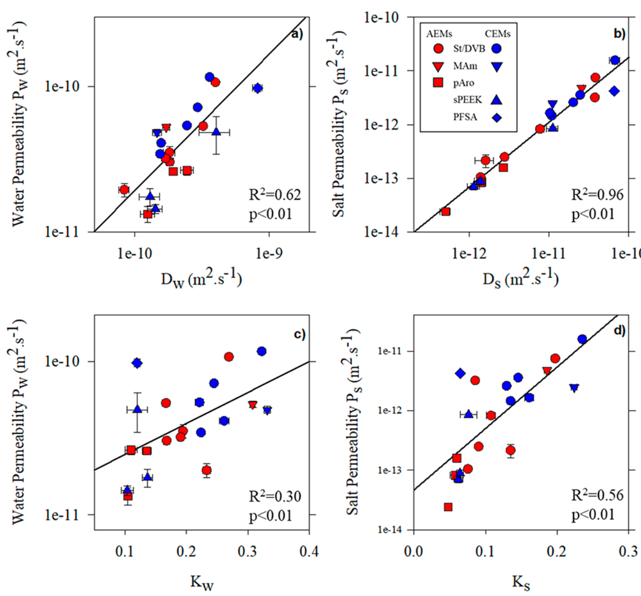

Figure 5. Water and salt transport properties of 20 commercial IEMs measured in a diffusion cell containing 4 M NaCl and pure water. (a) Water permeability vs water diffusion coefficient. (b) Salt permeability vs salt diffusion coefficient. (c) Water permeability vs water partition coefficient. (d) Salt permeability vs salt partition coefficient. The red symbols denote AEMs, the blue symbols denote CEMs, and the shape of the symbol indicates the membrane polymer type [see legend in the inset of panel (b)]. The error bars represent the propagated standard error of at least three replicates. Refer to Table 1 for definitions of the membrane polymer abbreviations.

We apologize for any inconvenience caused by this error.

1. Page 39751: "As with permeance, the permeability within each thickness group varied over nearly an order of magnitude from ~2×10^{-11} to 2×10^{-10} m^2 s^{-1} (Figure 4c and Figure S2)" should be corrected to "~1×10^{-11} to 1×10^{-10} m^2.s^{-1}".

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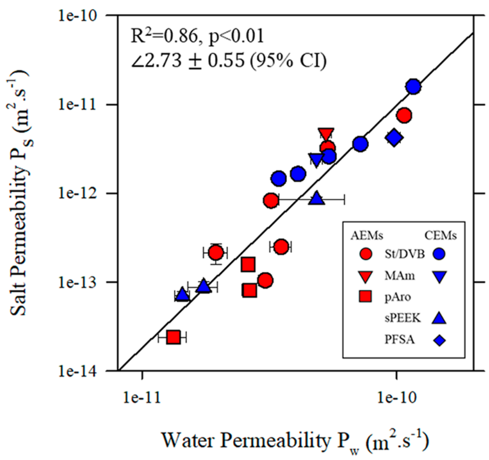

Figure 6. Water and salt permeability of 20 commercial IEMs measured in a diffusion cell containing 4 M sodium chloride solution and pure water. The red symbols denote AEMs, the blue symbols denote CEMs, and the shape of the symbol indicates the membrane polymer type (see legend). The error bars represent the propagated standard error of at least three replicates. Refer to Table 1 for definitions of the membrane polymer abbreviations.

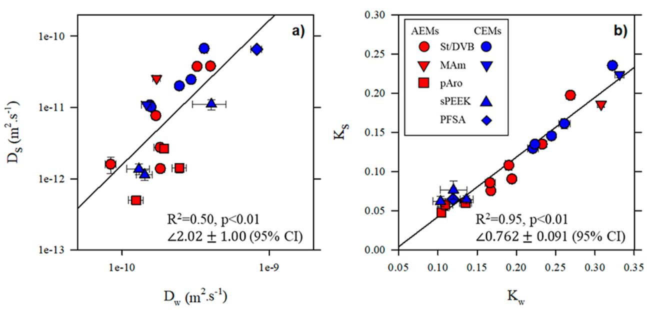

Figure 7. Water and salt (a) diffusion coefficients and (b) partition coefficients of 20 commercial IEMs measured in a diffusion cell containing 4 M sodium chloride solution and pure water. The red symbols denote AEMs, the blue symbols denote CEMs, and the shape of the symbol indicates the general polymer making up the membrane [see legend in the inset of panel (b)]. The error bars represent the propagated standard error of at least three replicates. Refer to Table 1 for definitions of the membrane and polymer abbreviations.

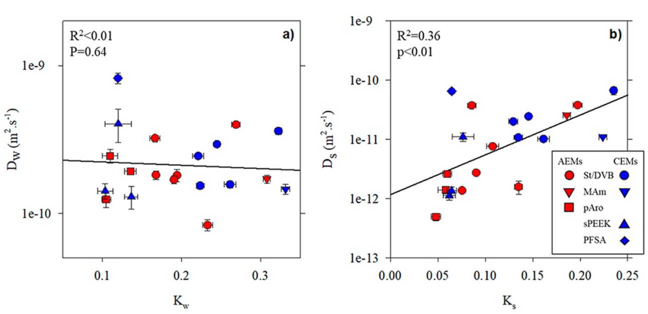

Figure S2. Permeability vs thickness for (a) water and (b) salt. The red symbols denote AEMs, the blue symbols denote CEMs, and the shape of the symbol indicates the membrane polymer type (see legend in the inset of panel (b)). The error bars represent the propagated standard error of at least three replicates. Refer to Table 1 in the main text for definitions of the membrane polymer abbreviations.

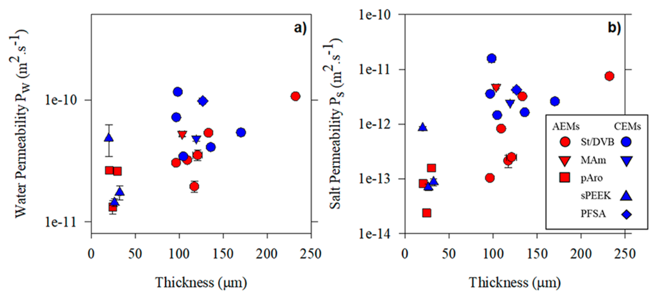

Figure S3. Relationship between diffusion coefficient D and partition coefficient K for (a) water and (b) salt. The red symbols denote AEMs, the blue symbols denote CEMs, and the shape of the symbol indicates the membrane polymer type (see legend in the inset of panel (b)). The error bars represent the propagated standard error of at least three replicates. Refer to Table 1 in the main text for definitions of the membrane polymer abbreviations.

2. Page 39751: "...the water diffusion coefficient D_w varied by about 1 order of magnitude, from 10^{-10} to 10^{-9} m^2 s^{-1}." should be corrected to " $\sim 8 \times 10^{-11}$ to 8×10^{-10} m^2 s^{-1}."
3. Page 39751: "D_w and K_w were not correlated with each other ($R^2 < 0.02$, $p = 0.41$, Figure S3)" should be corrected to "$R^2 < 0.01$, $p = 0.64$."
4. Page 39752: "The average P_w and P_s of the "thin" IEMs were 37% and just 6%, respectively, of the corresponding values for the "thick" IEMs." should be corrected to "43% and just 6%."
5. Page 39753: "log P_w and log P_s were strongly correlated for all IEMs studied ($R^2 = 0.90$, $p < 0.01$)" should be corrected to "($R^2 = 0.86$, $p < 0.01$)".
6. Page 39753: "The slope of the regression line in Figure 6 (2.57 ± 0.43)" should be corrected to "(2.73 ± 0.55)".
7. Page 39753: "log D_w and log D_s correlated moderately well ($R^2 = 0.65$, $p < 0.01$, Figure 7a), and the slope of the regression line (2.31) indicates that···" should be corrected to "$R^2 = 0.50$, $p < 0.01$" and "the slope of the regression line (2.02)".
8. Supporting Information Page S-5: "By this procedure we obtained χ values ranging from 0.18−1.06 for the 20 IEMs we studied (average = 0.59)." should be corrected to "0.64−1.55" and "(average = 1.11)".
9. Corrected versions of Figures 4c, 5a, 5c, 6, 7a, S2a, and S3a are shown above.
10. Corrected versions of Tables S4 and S5 are shown following the figures.

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Table S4. Permeability, Diffusion Coefficients, and Partition Coefficients[a] of Anion-Exchange Membranes

membrane	P_w (m^2 s^{-1})	D_w (m^2 s^{-1})	K_w	P_s (m^2 s^{-1})	D_s (m^2 s^{-1})	K_s
			Anion-Exchange Membranes			
Selemion AMV	$(3.21 \pm 0.15) \times 10^{-11}$	$(1.69 \pm 0.11) \times 10^{-10}$	0.19 ± <0.01	$(8.27 \pm 0.80) \times 10^{-13}$	$(7.67 \pm 0.87) \times 10^{-12}$	0.11 ± 0.01
Selemion ASA	$(3.05 \pm 0.18) \times 10^{-11}$	$(1.82 \pm 0.12) \times 10^{-10}$	0.17 ± <0.01	$(1.04 \pm 0.10) \times 10^{-13}$	$(1.38 \pm 0.14) \times 10^{-12}$	0.08 ± <0.01
Selemion ASV	$(3.52 \pm 0.34) \times 10^{-11}$	$(1.81 \pm 0.17) \times 10^{-10}$	0.19 ± <0.01	$(2.48 \pm 0.21) \times 10^{-13}$	$(2.75 \pm 0.24) \times 10^{-12}$	0.09 ± <0.01
Neosepta ACS	$(1.95 \pm 0.21) \times 10^{-11}$	$(8.35 \pm 0.72) \times 10^{-11}$	0.23 ± 0.01	$(2.14 \pm 0.55) \times 10^{-13}$	$(1.59 \pm 0.41) \times 10^{-12}$	0.14 ± <0.01
Neosepta AMX	$(5.35 \pm 0.08) \times 10^{-11}$	$(3.23 \pm 0.17) \times 10^{-10}$	0.17 ± 0.01	$(3.20 \pm 0.09) \times 10^{-12}$	$(3.74 \pm 0.22) \times 10^{-11}$	0.09 ± <0.01
Fumasep FAS-15	$(2.65 \pm 0.18) \times 10^{-11}$	$(2.45 \pm 0.27) \times 10^{-10}$	0.11 ± 0.01	$(8.18 \pm 0.38) \times 10^{-14}$	$(1.41 \pm 0.20) \times 10^{-12}$	0.06 ± 0.01
Fumasep FAS-30	$(2.60 \pm 0.15) \times 10^{-11}$	$(1.93 \pm 0.09) \times 10^{-10}$	0.14 ± 0.01	$(1.59 \pm 0.08) \times 10^{-13}$	$(2.64 \pm 0.25) \times 10^{-12}$	0.06 ± < 0.01
Fumasep FAB-30	$(1.33 \pm 0.17) \times 10^{-11}$	$(1.25 \pm 0.15) \times 10^{-10}$	0.10 ± 0.01	$(2.40 \pm 0.23) \times 10^{-14}$	$(5.00 \pm 0.72) \times 10^{-13}$	0.05 ± 0.01
PCCell PC-SA	$(1.07 \pm 0.02) \times 10^{-10}$	$(3.99 \pm 0.15) \times 10^{-10}$	0.27 ± 0.01	$(7.50 \pm 0.24) \times 10^{-12}$	$(3.80 \pm 0.15) \times 10^{-11}$	0.20 ± <0.01
Fujifilm Type III AEM	$(5.26 \pm 0.25) \times 10^{-11}$	$(1.71 \pm 0.11) \times 10^{-10}$	0.31 ± <0.01	$(4.76 \pm 0.23) \times 10^{-12}$	$(2.56 \pm 0.13) \times 10^{-11}$	0.19 ± <0.01

[a]Measured with the membrane separating 4 M NaCl solution and pure water.

Table S5. Permeability, Diffusion Coefficients, and Partition Coefficients[a] of Cation-Exchange Membranes

membrane	P_w (m^2 s^{-1})	D_w (m^2 s^{-1})	K_w	P_w (m^2 s^{-1})	D_s (m^2 s^{-1})	K_s
			Cation-Exchange Membranes			
Selemion CMV	$(3.44 \pm 0.10) \times 10^{-11}$	$(1.54 \pm 0.08) \times 10^{-10}$	0.22 ± <0.01	$(1.45 \pm 0.06) \times 10^{-12}$	$(1.08 \pm 0.06) \times 10^{-11}$	0.13 ± <0.01
Selemion CSO	$(7.19 \pm 0.28) \times 10^{-11}$	$(2.94 \pm 0.12) \times 10^{-10}$	0.24 ± <0.01	$(3.57 \pm 0.14) \times 10^{-12}$	$(2.45 \pm 0.10) \times 10^{-11}$	0.15 ± <0.01
Neosepta CMS	$(4.09 \pm 0.10) \times 10^{-11}$	$(1.57 \pm 0.09) \times 10^{-10}$	0.26 ± 0.01	$(1.64 \pm 0.12) \times 10^{-12}$	$(1.01 \pm 0.08) \times 10^{-11}$	0.16 ± 0.01
Neosepta CMX	$(5.40 \pm 0.12) \times 10^{-11}$	$(2.45 \pm 0.03) \times 10^{-10}$	0.22 ± 0.01	$(2.60 \pm 0.18) \times 10^{-12}$	$(2.00 \pm 0.16) \times 10^{-11}$	0.13 ± <0.01
Fumasep FKE-15	$(4.84 \pm 1.40) \times 10^{-11}$	$(4.04 \pm 1.02) \times 10^{-10}$	0.12 ± 0.02	$(8.49 \pm 0.62) \times 10^{-13}$	$(1.11 \pm 0.18) \times 10^{-11}$	0.08 ± 0.01
Fumasep FKE-30	$(1.74 \pm 0.24) \times 10^{-11}$	$(1.30 \pm 0.23) \times 10^{-10}$	0.14 ± 0.01	$(8.82 \pm 1.30) \times 10^{-14}$	(1.36 ± 0.23)	0.06 ± 0.01
Fumasep FKL-30	$(1.44 \pm 0.10) \times 10^{-11}$	$(1.42 \pm 0.17) \times 10^{-10}$	0.10 ± 0.01	$(7.04 \pm 0.90) \times 10^{-14}$	(1.13 ± 0.19)	0.06 ± 0.01
PCCell PC-SK	$(1.16 \pm 0.06) \times 10^{-10}$	$(3.61 \pm 0.19) \times 10^{-10}$	0.32 ± <0.01	$(1.58 \pm 0.23) \times 10^{-11}$	$(6.72 \pm 1.00) \times 10^{-11}$	0.24 ± <0.01
Nafion N115	$(9.77 \pm 0.55) \times 10^{-11}$	$(8.22 \pm 0.69) \times 10^{-10}$	0.12 ± <0.01	$(4.24 \pm 0.27) \times 10^{-12}$	$(6.54 \pm 0.50) \times 10^{-11}$	0.06 ± <0.01
Fujifilm Type III CEM	$(4.84 \pm 0.25) \times 10^{-11}$	$(1.46 \pm 0.11) \times 10^{-10}$	0.33 ± 0.01	$(2.46 \pm 0.02) \times 10^{-12}$	$(1.10 \pm 0.02) \times 10^{-11}$	0.22 ± <0.01

[a]Measured with the membrane separating 4 M NaCl solution and pure water.

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