

# Multifunctional Heterogeneous Ion-Exchange Membranes for Ion and Microbe Removal in Low-Salinity Water

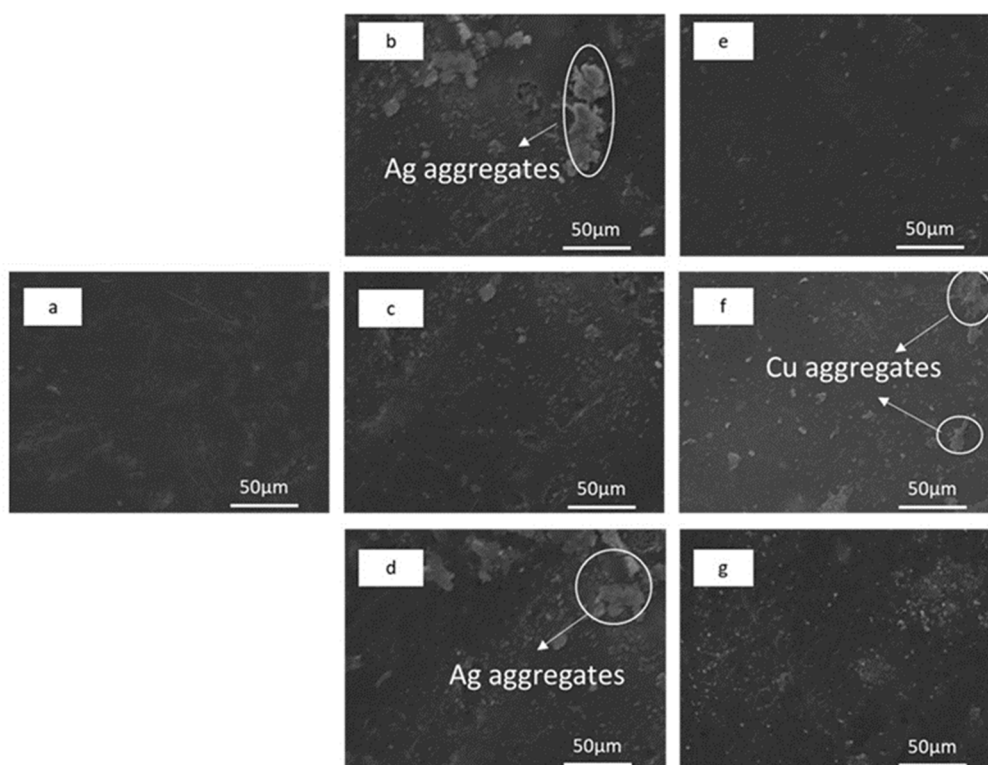
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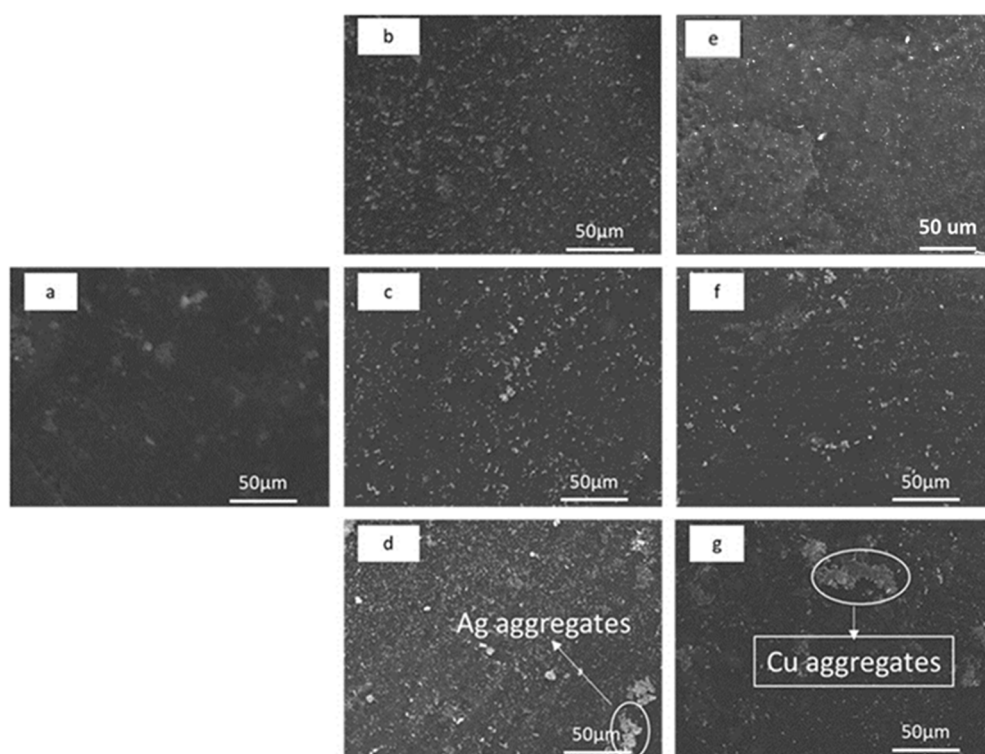
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## Surface morphology of prepared ion exchange membranes



**Figure S1.** SEM images of neat and functionalized Ag and Cu custom-made UF heterogeneous CEM-3.5 membranes: (a) CEM-3.5, (b) CEM-Ag1, (c) CEM-Ag2, (d) CEM-Ag3, (e) CEM-Cu1, (f) CEM-Cu2 and (g) CEM-Cu3.



**Figure S2.** SEM images of neat and functionalized Ag and Cu custom-made heterogeneous AEM-3.5 membranes: (a) AEM-3.5, (b) AEM-Ag1, (c) AEM-Ag2, (d) AEM-Ag3, (e) AEM-Cu1, (f) AEM-Cu2 and (g) AEM-Cu3.