

Supplementary Information

A 3D Binder-free rGO/NiMnCo Nanosheet: Towards High Efficient Hybrid Supercapacitors and Ion-Selective Capacitive Deionization

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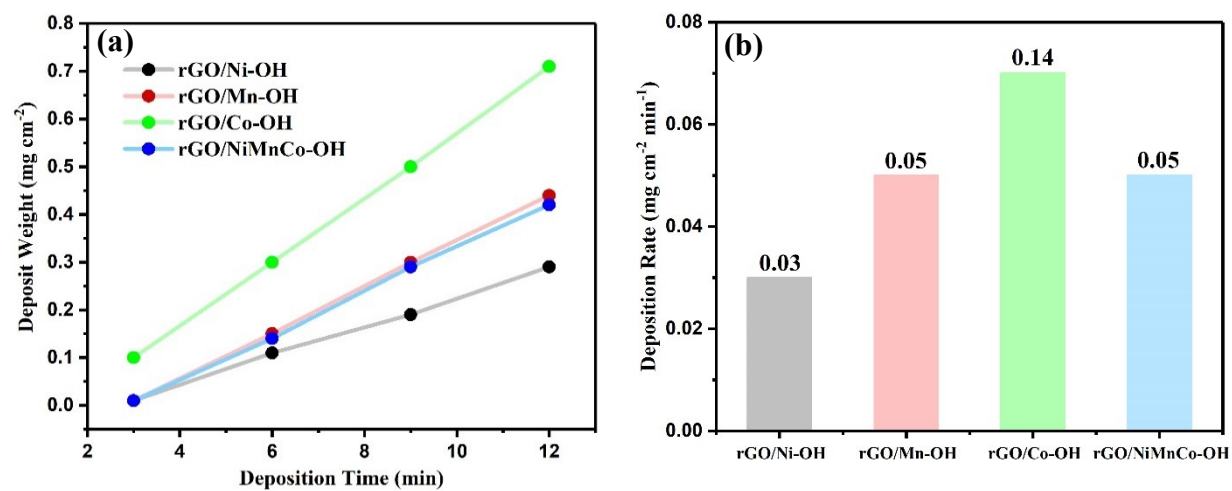


Fig. S1 (a) Deposit weight and (b) deposition rate of the electrodes

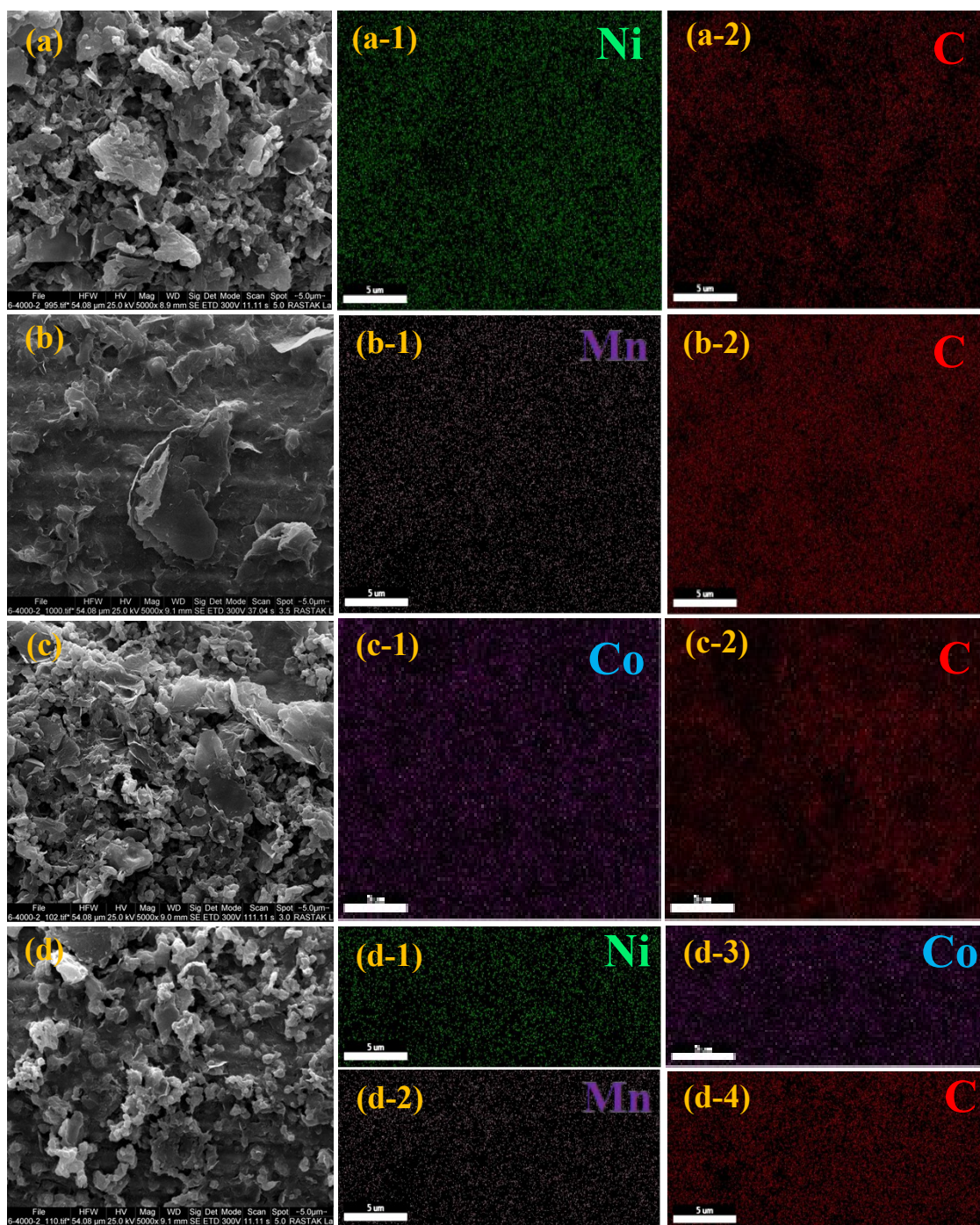


Fig. S2 FE-SEM and EDS elemental mapping images of (a) rGO/Ni-OH nanosheet, (b) rGO/Mn-OH nanosheet, (c) rGO/Co-OH nanosheet, and (d) rGO/NiMnCo-OH nanosheet.

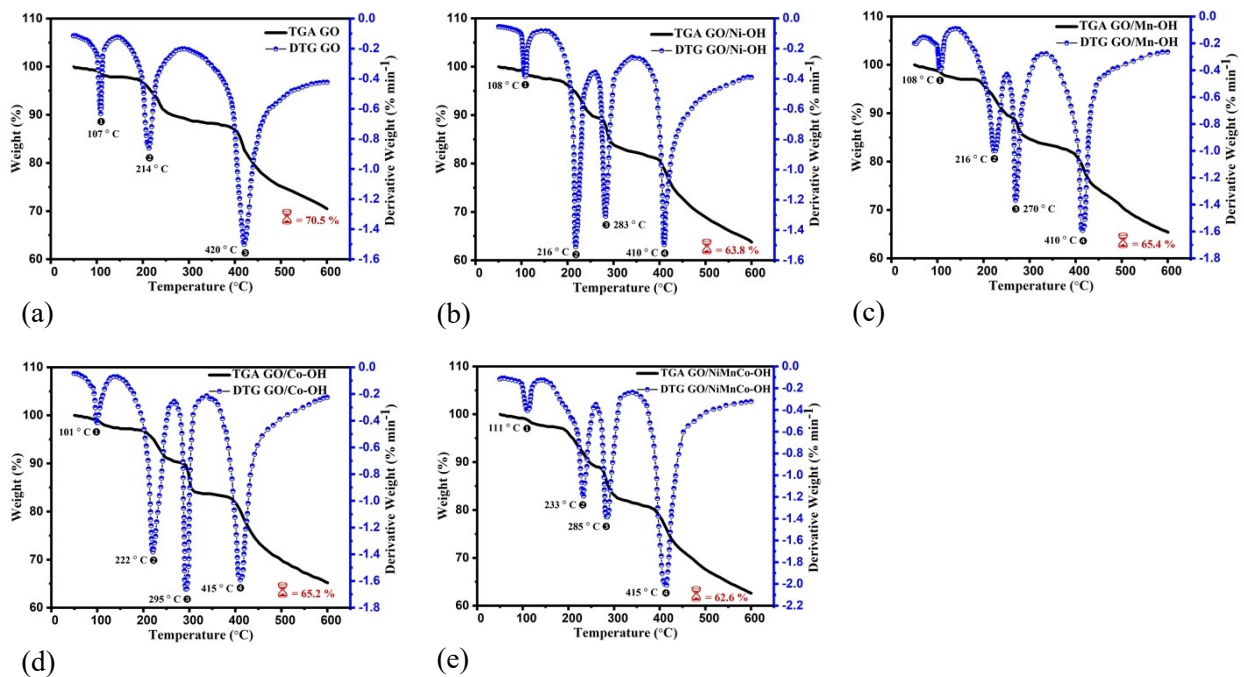


Fig. S3. TGA and DTG curves of (a) rGO, (b) rGO/Ni-OH nanosheet, (c) rGO/Mn-OH nanosheet, (d) rGO/Co-OH nanosheet, and (e) rGO/NiMnCo-OH nanosheet.

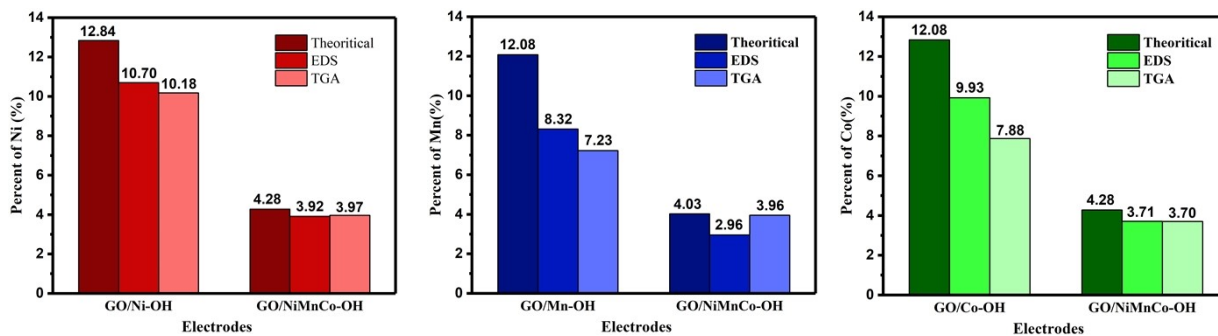


Fig. S4. The calculated weight percentages of (a) Ni, (b) Mn, and (c) Co elements in different synthesized nanosheet materials using theoretical, EDS, and TGA methods.

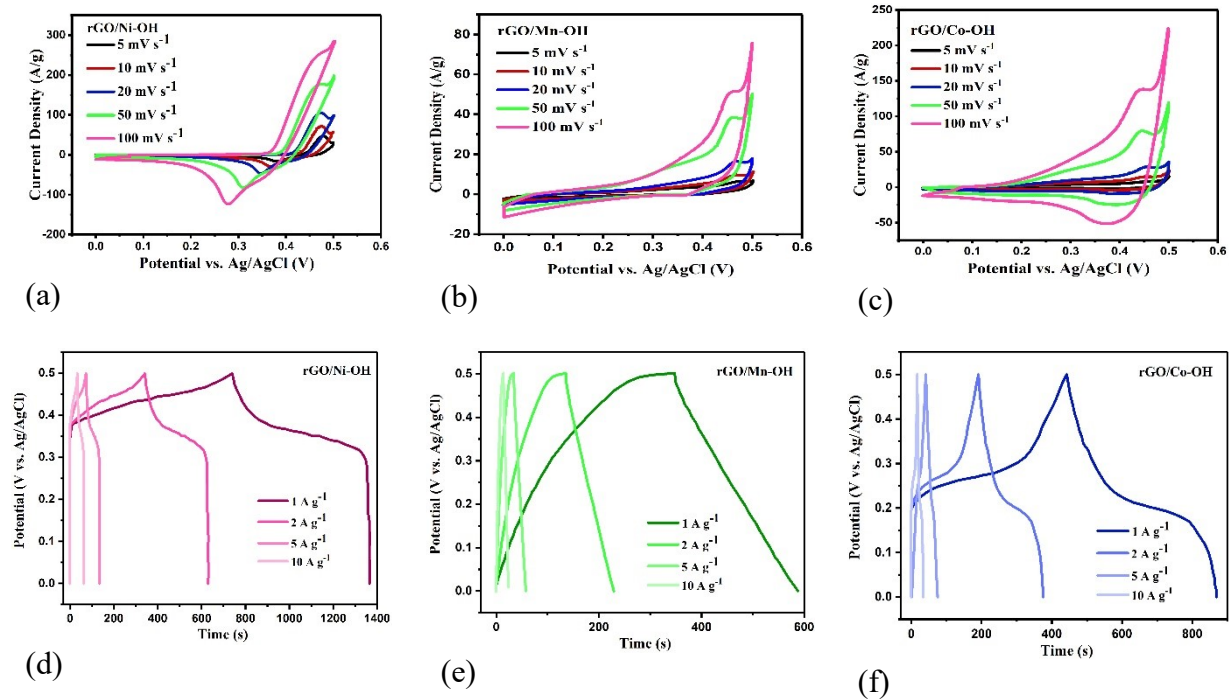
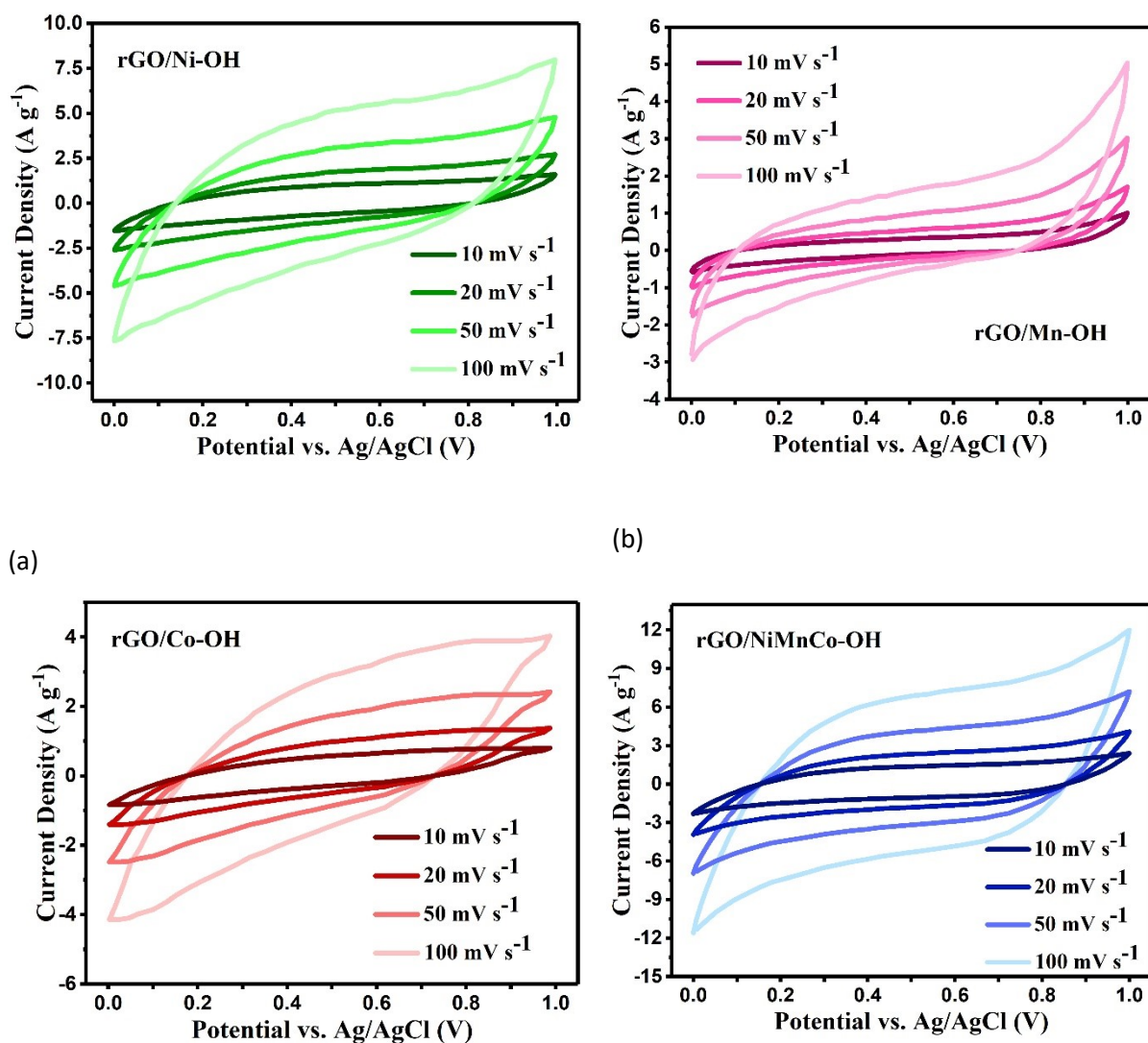


Fig. S5. CV curves of (a) rGO/Ni-OH, (b) rGO/Mn-OH, and (c) rGO/Co-OH nanosheet electrodes at different scan rates. GCD curves of (a) rGO/Ni-OH, (b) rGO/Mn-OH, and (c) rGO/Co-OH nanosheet electrodes at current densities.



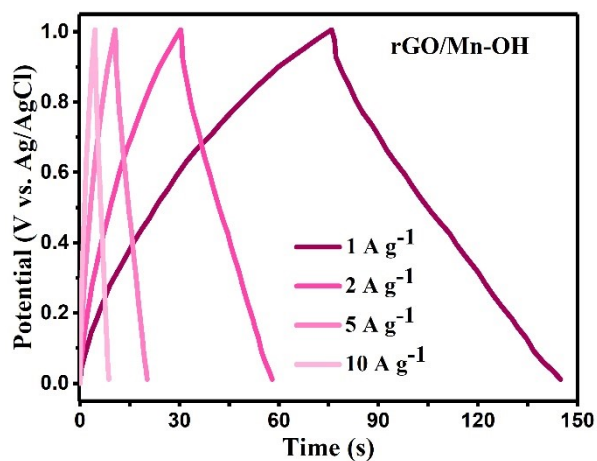
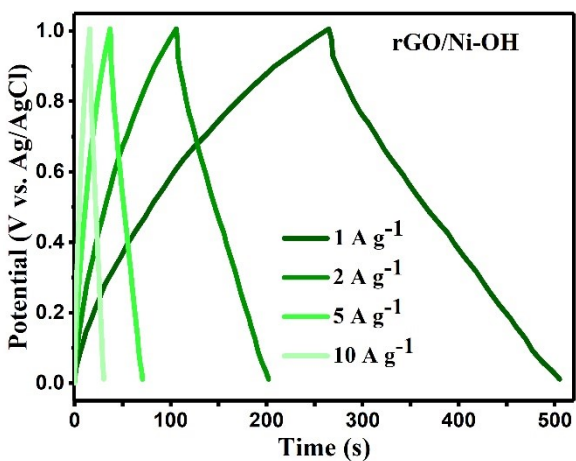
(a)

(b)

(c)

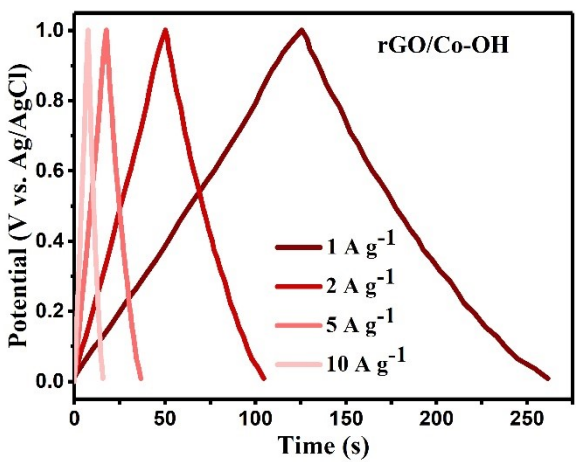
(d)

Fig. S6. CV curves of (a) rGO/Ni-OH, (b) rGO/Mn-OH, and (c) rGO/Co-OH, and (d) rGO/NiMnCo-OH nanosheet electrodes at different scan rates in multi-ions water solution with concentration of 400 mg L⁻¹.

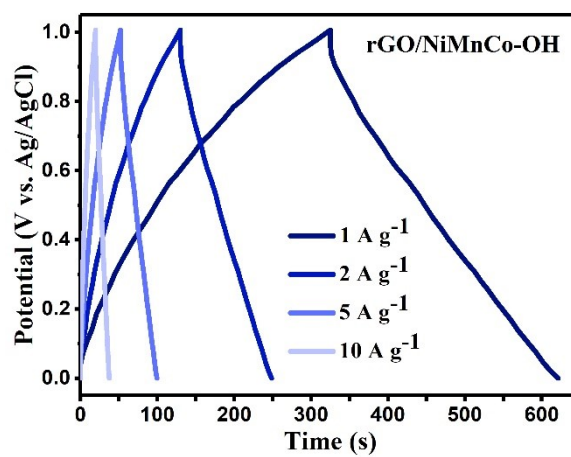


(a)

(b)



(c)



S7(d)

Fig. S7. GCD curves of (a) rGO/Ni-OH, (b) rGO/Mn-OH, and (c) rGO/Co-OH, and (d) rGO/NiMnCo-OH nanosheet electrodes at different current densities in multi-ions water solution with concentration of 400 mg L⁻¹.

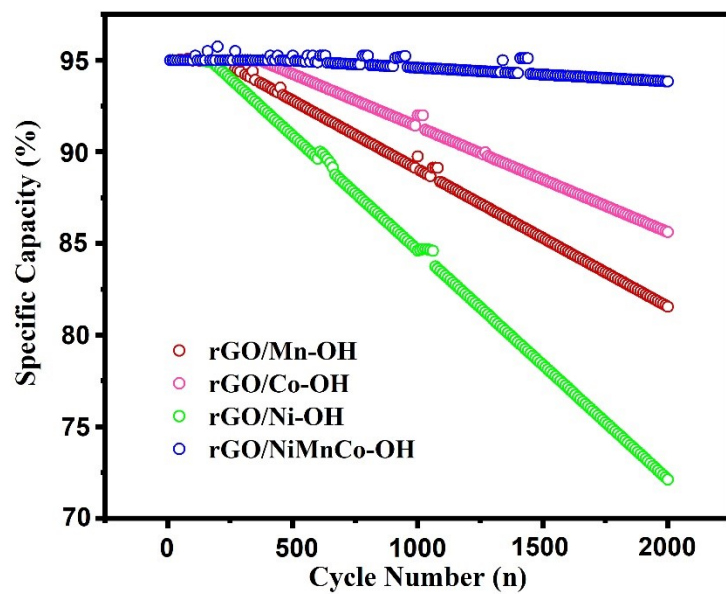


Fig. S8 specific capacities of electrode materials calculated by GCD plots at 1 A g⁻¹

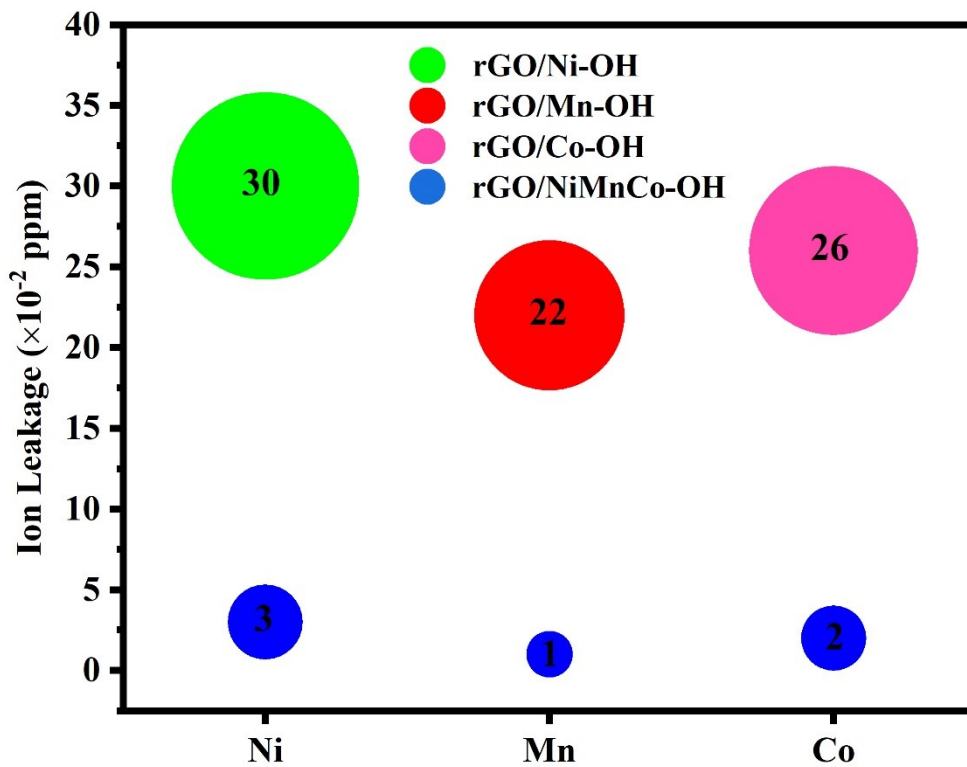


Fig. S9 concentration of the Ni, Mn, and Co ions in the treated multi-ions water (after 100 desalination-regeneration cycles) for all the CDI nanosheet electrodes

Table S1 Different CDI solutions (CDI test 1- CDI test 4)

C-ratio	CDI test 1	CDI test 2	CDI test 3	CDI test 4
$C_{eq,K^+}/C_{eq,Na^+}$	0.998	0.692	0.5	0.273
$C_{eq,Mg^{2+}}/C_{eq,Na^+}$	0.987	0.692	0.5	0.273
$C_{eq,Ca^{2+}}/C_{eq,Na^+}$	0.978	0.692	0.5	0.273
$C_{ads,K^+}/C_{ads,Na^+}$	1.109	0.747	0.555	0.301
$C_{ads,Mg^{2+}}/C_{ads,Na^+}$	1.1807	0.815	0.595	0.323
$C_{ads,Ca^{2+}}/C_{ads,Na^+}$	1.254	0.876	0.636	0.344