Electronic Supplementary Material (ESI) for Environmental Science: Water Research & Technology.

High Performance Hybrid Capacitive Deionization with Ag-coated Activated Carbon Electrode

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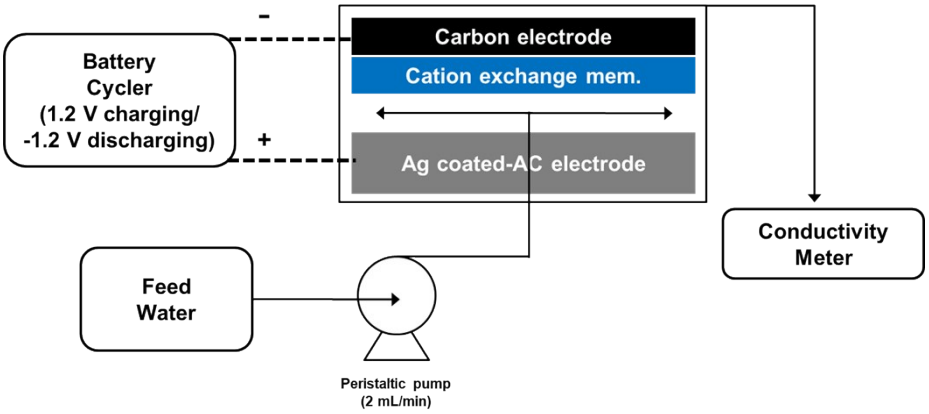
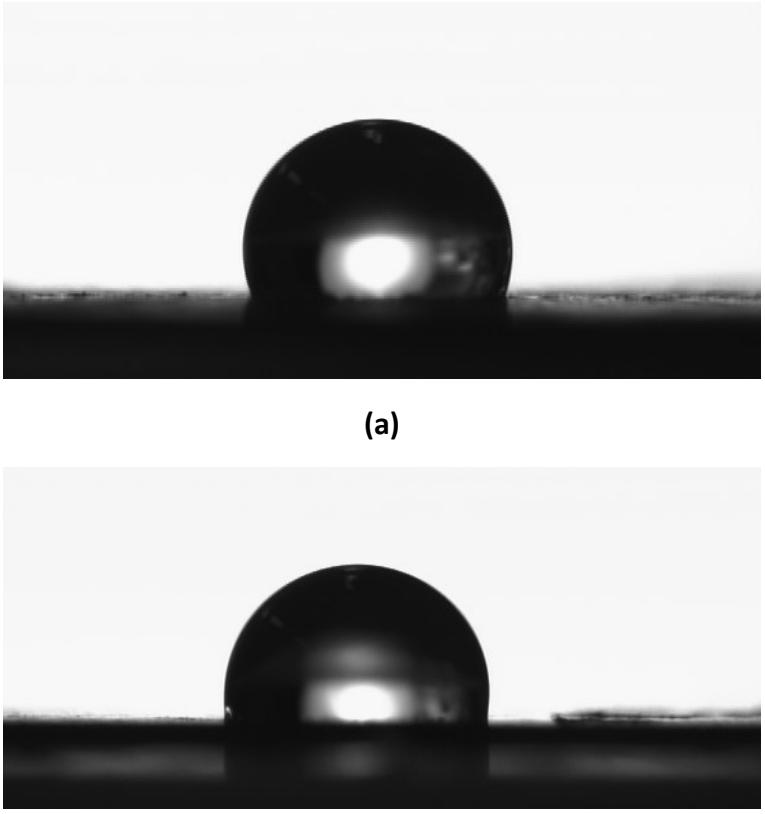


Fig S1. Schematic of deionization cell.



(a)

(b)

Fig. S2 Contact angle images of (a) pristine activated carbon (AC) electrode (110^{o}) and (b) Ag-coated AC electrode (95^{o}).

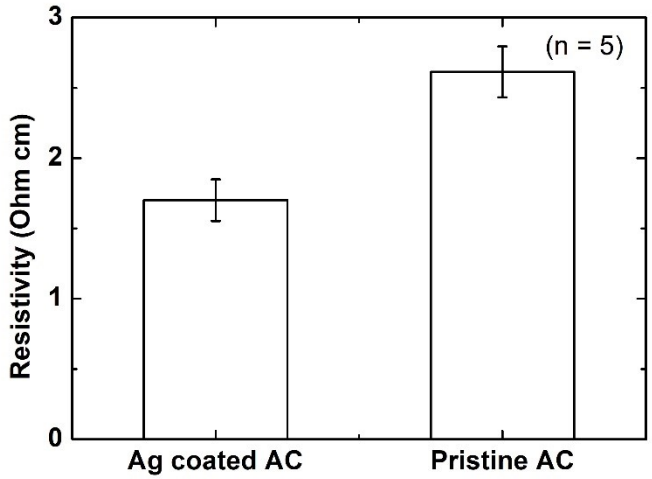


Fig. S3 Electrode resistivity of the HCDI with Ag coated AC and pristine AC.

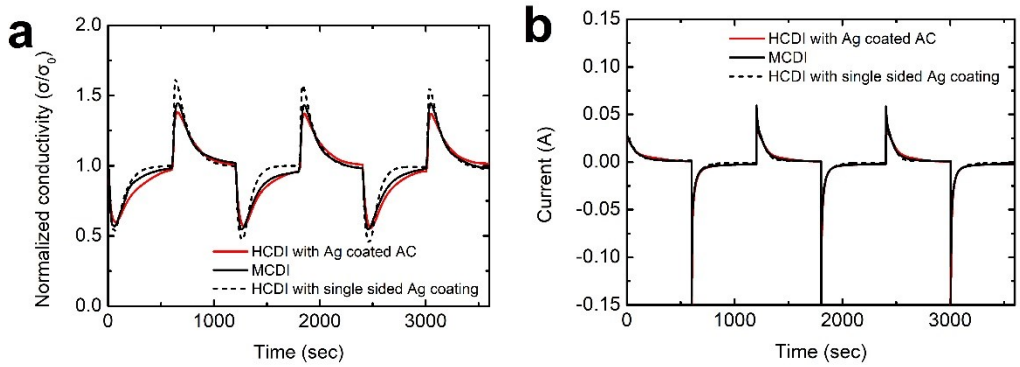


Fig. S4 (a) Normalized conductivity with time of the effluent (the initial conductivity was 1.15 ± 0.05 mS/cm). (b) Current profiles of the three different system configuration (i.e., HCDI with Ag coated AC, MCDI, and HCDI with single sided Ag coating). (Feed: 10 mM NaCl, Applied electrical potential: 1.2 V at adsorption / -1.2 V at desorption, Flow rate: 2 mL/min).

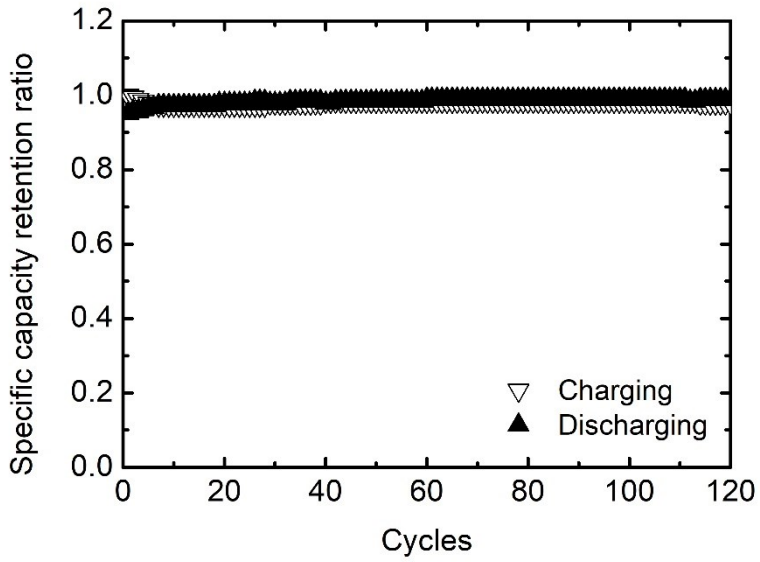


Fig. S5 Capacity retention of the HCDI with Ag coated AC with respect to the cycle number (electrolyte: 2 M NaCl, potential range: -0.1 ~ 1.2 V, current density: 10 mA/cm^2).

Table S1. The deionization performance expressed as salt adsorption capacity (SAC) (i.e., deionization capacity) and charge efficiency of the HCDI with Ag provided in the previous researches

Electrode	Salt adsorption capacity (mg/g)	Charge efficiency (%)	Feed water (mg NaCl/L)	Applied voltage (V)	Ref
Ag coated activated carbon (AC)	23.3	75	584.4	1.2	This work
	14.0	98		0.7	
Single sided Ag coating on AC electrode	15.6	92	584.4	0.7	1
MnO2/AC // Ag/AC	17.8	83	1168.8	1.2	2
Ag-Cu-graphene	16.8	90	600	1.2	3
CNTs-Si-Ag	17.5 (@ 3rd cycle)	20 (current eff.)	not provided	1.0	4
Ag-doped sepiolite intercalated graphene	20.7	87	600	1.2	5
Ag-doped hollow ZIFs-derived nanoporous carbon	29.2	60	500	1.2	6

Table S1 shows the salt adsorption capacity (i.e., deionization capacity) and charge efficiency of the HCDI with Ag-coated AC in comparison with the results in the previous researches. As shown in Table R1, this research work showed good SAC and charge efficiency compared to the results in the previous researches. First, in terms of SAC, among the studies using commercially available electrode substrate materials (activated carbon (AC), CNT, graphene), this work showed the best SAC (23.3 mg/g). One study that reported better SAC than this work is a case with hollow ZIFs-derived nanoporous carbon.[6] However, since hollow ZIFs-derived nanoporous carbon is not a commercially available electrode substrate material, it is considered that it may be limited in terms of commercial application. Second, in terms of charge efficiency, a study that reported a charge efficiency superior to this study was introduced, but in the case of 0.7 V operation, the charge efficiency introduced in this study was the best (98%).

Reference

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