Supporting Information

Activated Luffa derived biowaste carbon for enhanced desalination performance in brackish water

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**Fig. S1** MCDI experimental setup.

**Fig. S2** (a) Full scan XPS spectrum of SDL-C and SDL-A and High resolution spectra of O 1s for (b) SDL-C and (c) SDL-A.
Table. S1 Parameters of electronics elements in the equivalent circuit in Figure 4a

| Sample  | $R_e$ (Ω) | $R_{ct}$ (Ω) | $Z_w$ (Ω) |
|---------|-----------|--------------|-----------|
| SDL-C   | 6.001     | 61.9         | 1.976     |
| SDL-A   | 1.457     | 4.129        | 0.086     |

Fig. S3 CV curves of SDL-C at a different scan rate from 1 mV to 200 mV/s, measured in a three-electrode system with 1M NaCl electrolyte solution.
Fig. S4. (a) The electrosorption kinetics of NaCl onto the SDL-A electrodes at different voltages, and (b) Langmuir adsorption isotherm of NaCl onto the SDL-A at different equilibrium concentrations at 1.2 V.

Table S2 Parameters of Langmuir isotherm study of SDL-A in 2500 mg/L NaCl solution at 1.2 V

| Sample               | $R_e$ (Ω)       |
|----------------------|-----------------|
| Linear equation      | $Y = 0.02209x + 7.98835$ |
| Coefficients         | $q_m = 45$ mg/g, $K_L = 0.0027$ L/mg |
| $R^2$                | 0.94234         |