Electronic Supplementary Information

Improving thermo-electrochemical cell performances by constructing Ag-MgO-CNTs nanocomposite electrodes

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SI-1. Pictures and tensile tests of the CNTs electrode with different Mg^{2+} concentrations.

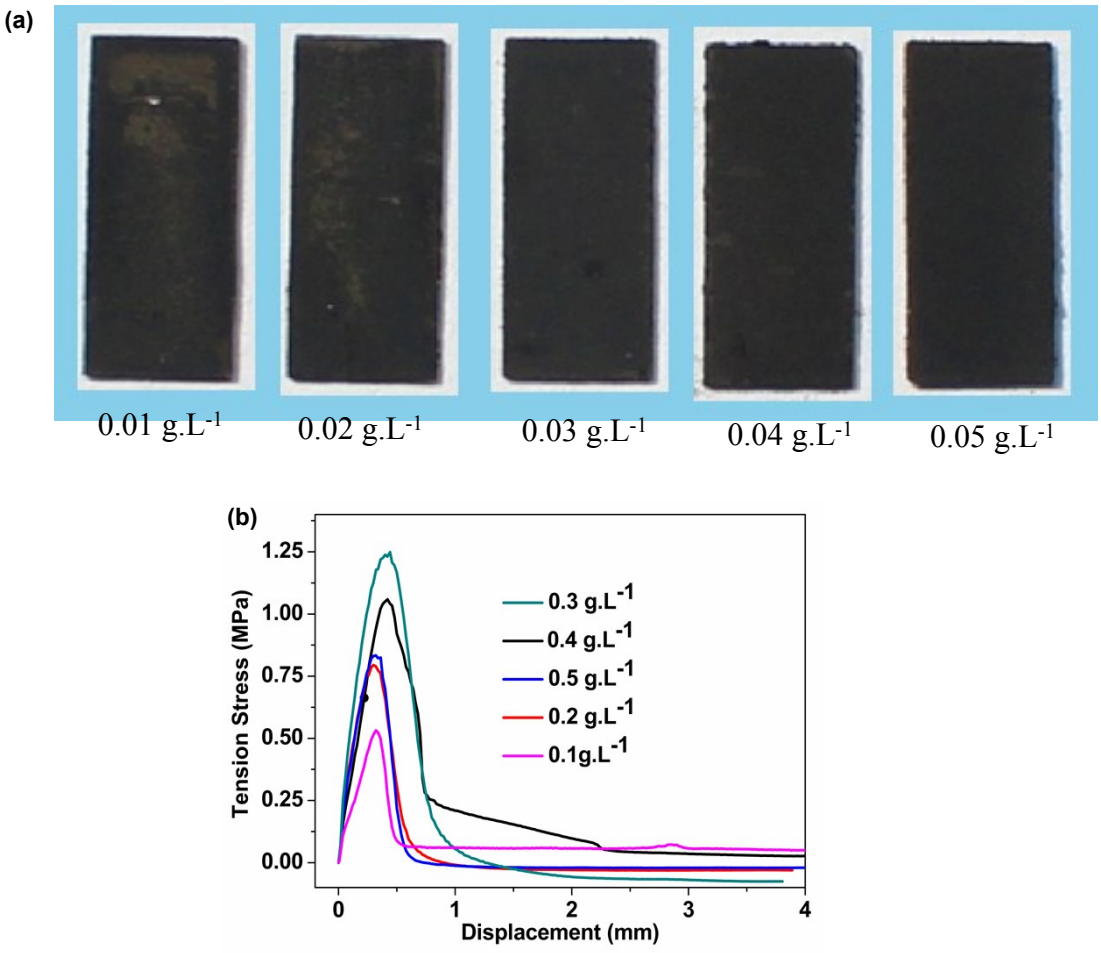

Fig. S1 (a) Pictures and (b) tensile tests of the CNT electrodes prepared by EPD method with different Mg^{2+} concentrations. Note: With the increasing concentration of Mg^{2+}, CNTs will become more thicker and too much CNTs is away from the substrate, so it can more easily detach from the substrate by the external force.

We chose the concentration of Mg^{2+} with the fixed value ($0.03 g.L^{-1}$) due to the following reasons. First, the lower concentration of Mg^{2+} ($<0.03 g.L^{-1}$) would bring carbon nanotubes (CNTs) to the anode to form the inhomogeneous film on the stainless steel (SS) substrate by EPD method (see Fig. S1a). Second, with the increasing concentration of Mg^{2+}($>0.03 g.L^{-1}$), the adhesion between the CNT films and the SS substrate would be decreased from1.25 MPa to 0.84 MPa (see Fig. S1b). In addition, the excessive existence of Mg^{2+} would decrease the conductivity of the CNTs electrode due to the formation of MgO after the heat treatment.[4,5]

SI-2. XPS spectrum of the Ag-MgO-CNTs nanocomposite

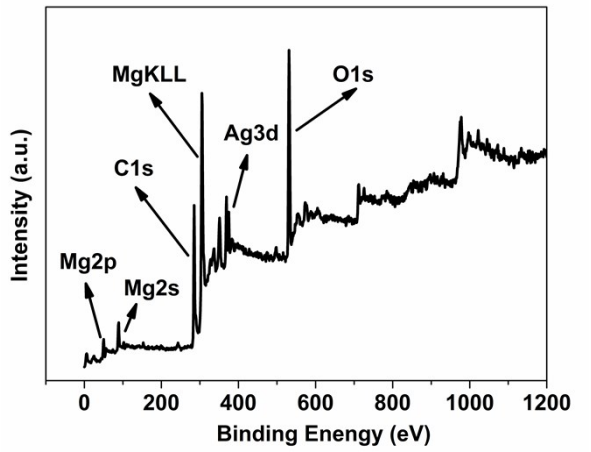

Fig. S2 Survey XPS spectrum of the Ag-MgO-CNTs-0.01 sample.The anticipated signals from C, Mg and Ag are detected for the composite, in agreement with the EDS results (Fig.2b in the main text). O signal mainly comes from the surface oxidation due to the heat treatment.

SI-3. XPS data on the elemental contents of the CNTs-based nanocomposites

Table S1 XPS data on the elemental contents of the CNTs-based nanocomposites

Sample	C (%)	O (%)	Mg (%)	Ag (%)
Ag-MgO-CNTs-0.002	57.80	33.68	7.92	0.59
Ag-MgO-CNTs-0.005	40.23	46.84	10.52	2.40
Ag-MgO-CNTs-0.01	52.32	34.33	9.58	3.77
Ag-MgO-CNTs-0.02	49.77	36.43	7.66	6.08
Ag-MgO-CNTs-0.04	61.06	20.14	5.55	13.25

SI-4. Comparison of TEC performances of the CNTs-based nanocomposites electrodes

Table S2. Comparison of TEC performances between this work and previous research of the CNTs-based nanocomposites electrodes

Sample	j_{sc} ($A.m^{-2}$)	P_{max} ($W.m^{-2}$)	η_r (%)	Ref.
CNTs-rGO	Not stated	1.85	2.63	6
C-ACT*	0.39	$0.46*10^{-3}$	0.078	7
Ag-MgO-CNTs-0.005	18.6	0.34	0.6	this work

*Note: the data of η_r was from the Supplementary Information of this literature.

Reference

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