Supporting Information

Enhanced moisture-enabled electricity generation through carbon dots surface functionalization with strong ionizing organic acid

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Materials and Methods

Material characterization

The TEM images were acquired using a Talos F200X transmission electron microscope (FEI, USA) operating at 200 kV. The morphology and structure of the CD@paper were characterized via scanning electron microscopy (SEM, FEI Nova Nano450). FTIR spectroscopy was performed on a Bruker Tensor 27 spectrophotometer (Germany). X-ray photoelectron spectroscopy (XPS) measurements were performed using an ESCALAB 250 XPS system (Thermo Electron Corporation, USA). The zeta potentials of the pure/modified CDs measurement were measured by a particle sizer analyzer (Zeta sizer Nano ZSP, Malvern Instruments Limited, UK). The current-voltage characteristics of the device were measured using a Keithley 2400 source measurement unit.

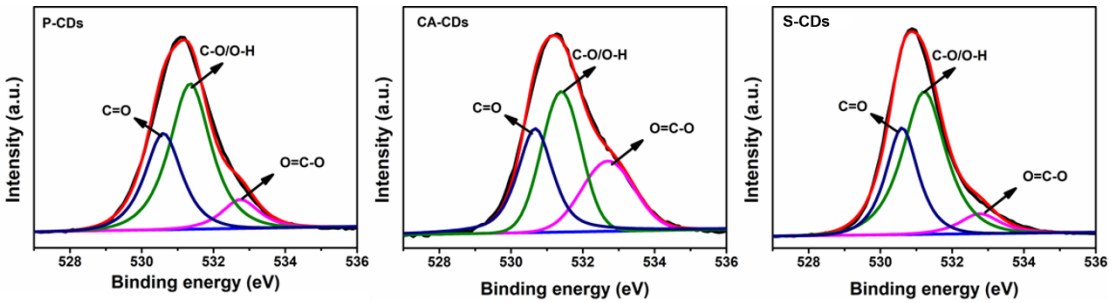

Fig. S1. The high-resolution O 1s XPS spectrum of the CDs

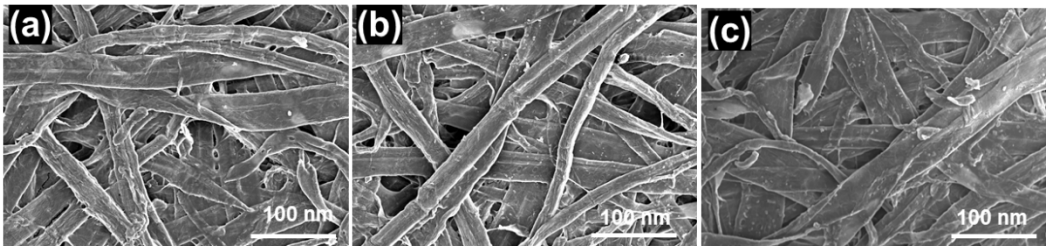

Fig. S2. SEM image of P-CDs@paper (a), CA-CDs@paper (b) and S-CDs@paper (c).

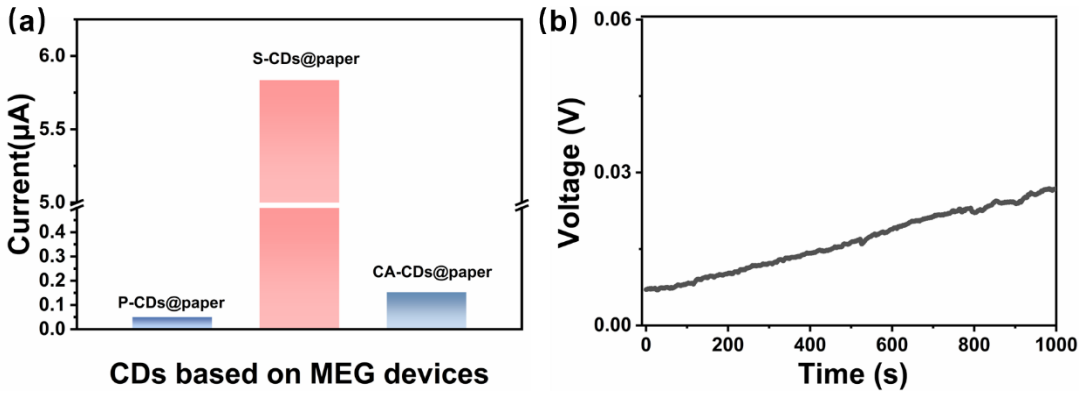

Fig. S3. (a) Measured currents of the CD-based MEG devices. (b) Measured voltage of the P-CD based MEG device.

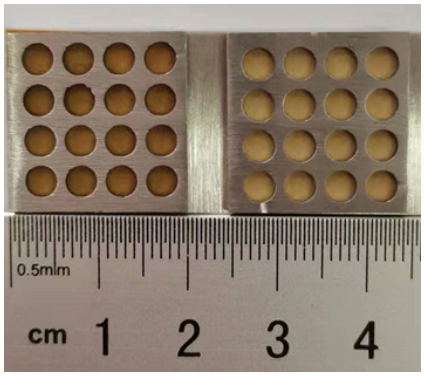

Fig. S4. Digital photos of CDs@paper device.

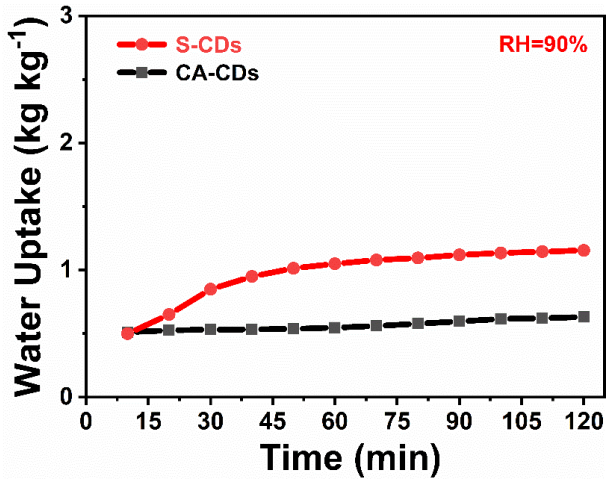

Fig. S5. The moisture uptake capability with time after the dried samples are exposed in the high-humidity atmosphere (90% RH).

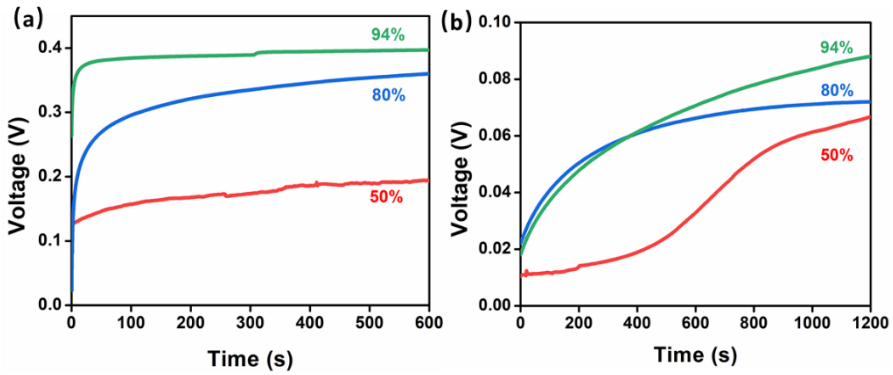

Fig. S6. (a)Voltage output of S-CD based MEG devices under different humidities. (b) Voltage output of CA-CD based MEG devices under different humidities.

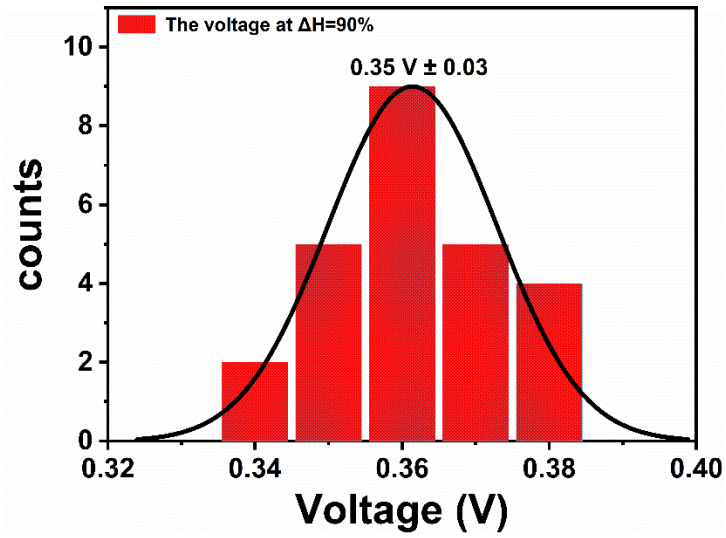

Fig. S7. The repeatability test of the S-CD-based MEG devices

Table S1 Summary of recent MEGs

Ref	**Material**	**Voltage** (V)	**Current density** (cm^{-2})
1	GO	0.45	2μA
2	GO	0.3	0.7 μA
3	Protein	0.5	115 nA
4	Silk	0.13	0.1 μA
5	Cellulose	0.25	15 nA
6	CNPs		12.6 nW
7	GO/Cellulose	0.286	
8	Carbon Dots	0.04	0.142 μA
9	Carbon nanoparticles	0.068	3nA
10	Graphene Quantum Dots	0.27	27.7 mA
Our work	**Carbon Dots**	**0.38**	**1.5 μA**

References

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