Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.
This journal is © The Royal Society of Chemistry 2022

Electronic Supplementary Information

Electricity generation from water evaporation through high-conductive carbonized wood with abundant hydroxyls

Zaimiao Zhang, Yaru Zheng, Nan Jiang, Wenqing Hong, Tianyu Liu, Hao Jiang, Yanjie Hu,*

Chunzhong Li

Shanghai Environmental Friendly Materials Technical Service Platform, Key Laboratory for Ultrafine Materials of Ministry of Education, School of Materials Science and Engineering, East China University of Science and Technology, Shanghai 200237, China

E-mail: huyanjie@ecust.edu.cn (Prof. Yanjie Hu).

Part I: Supporting Figures

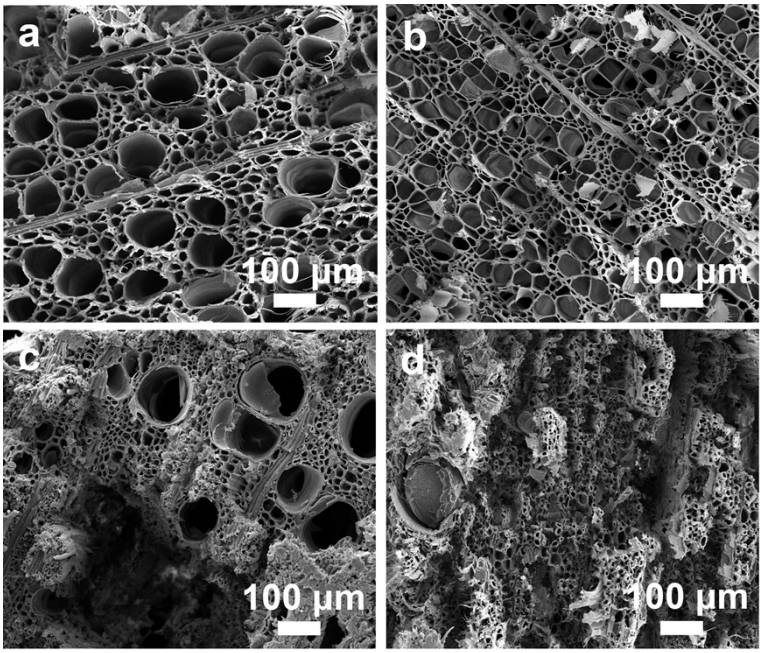

Fig. S1. SEM images of (a) paulownia, (b) basswood, (c) beech and (d) rosewood.

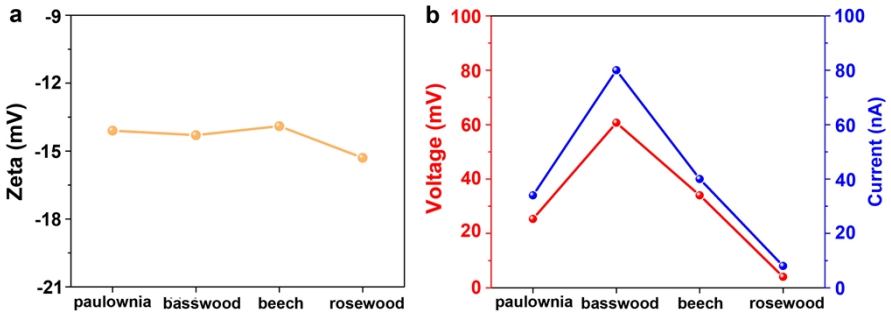

Fig. S2. (a) Zeta potential and (b) the V_{oc} and I_{sc} of these wood.

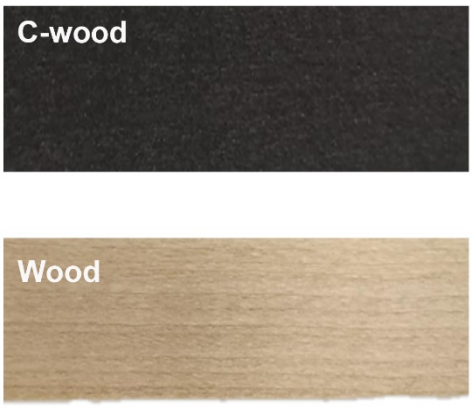

Fig. S3. Photograph of C-wood and wood treated at 130 °C.

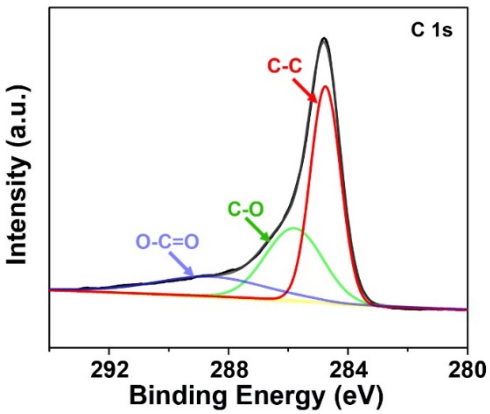

Fig. S4. X-ray photoelectron spectroscopy (XPS) of the C-wood.

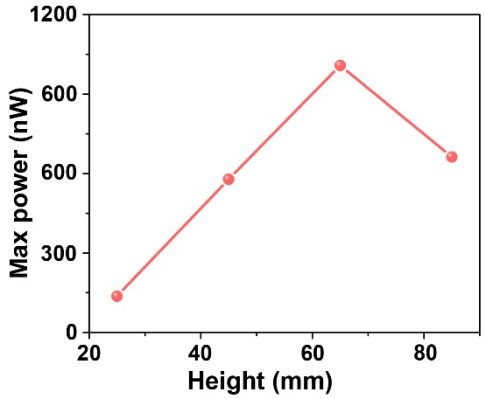

Fig. S5. The maximum power of the WHEG varying with the height of C-wood.

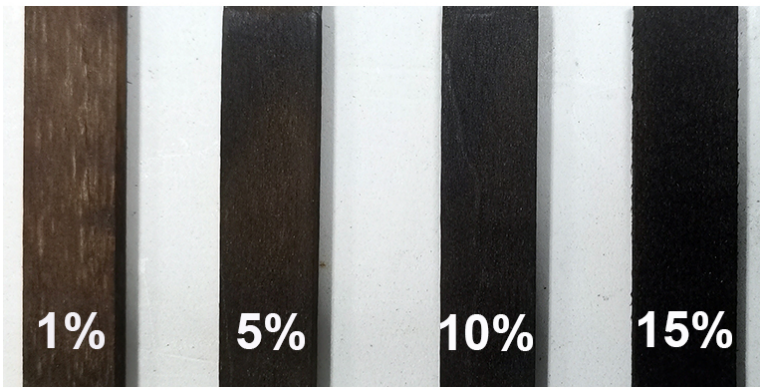

Fig. S6. Photograph of C-wood treated in different concentrations of $FeCl_3$ solutions.

Fig. S7. Photograph of C-wood treated in 20 wt% $FeCl_3$ solution.

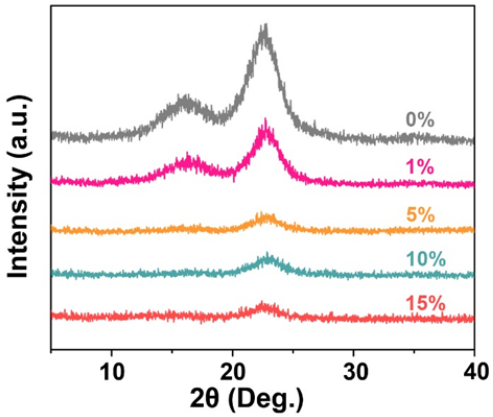

Fig. S8. XRD patterns of C-wood treated with different concentrations of $FeCl_3$ solution..

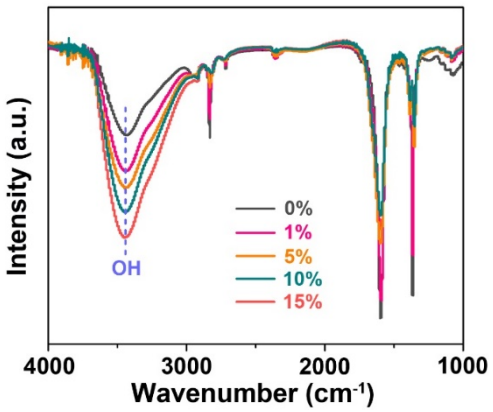

Fig. S9. FTIR spectrums of C-wood treated with different concentrations of $FeCl_3$ solution.

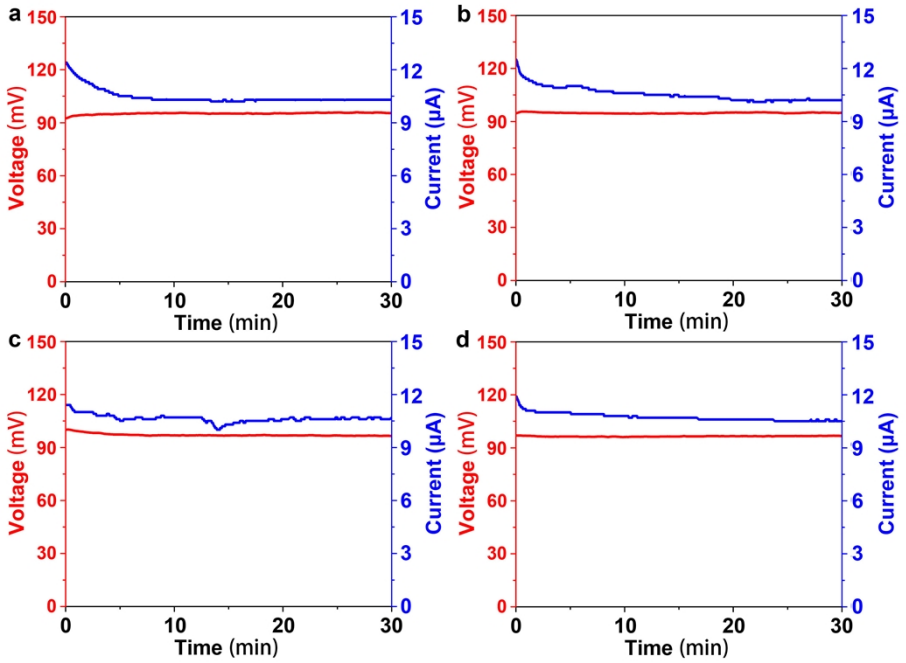

Fig. S10. The V_{oc} and I_{sc} of WHEG with (a) gold (Au), (b) silver (Ag), (c) platinum (Pt) and (d) copper (Cu) electrode under ambient environment.

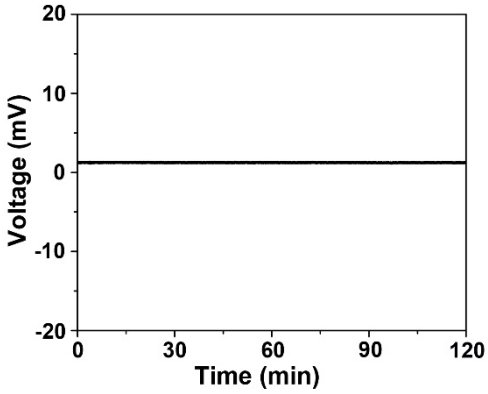

Fig. S11. The open-circuit voltage (V_{oc}) of a WHEG not in water.

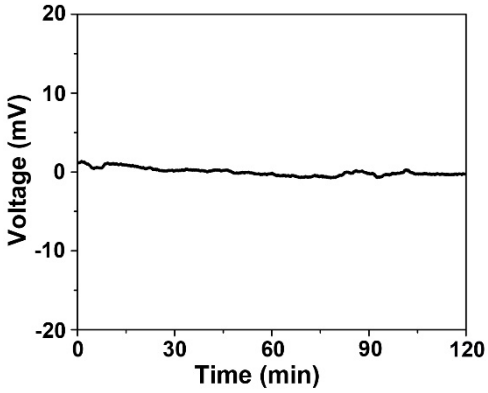

Fig. S12. The open-circuit voltage (V_{oc}) of a WHEG fully immersed in water.

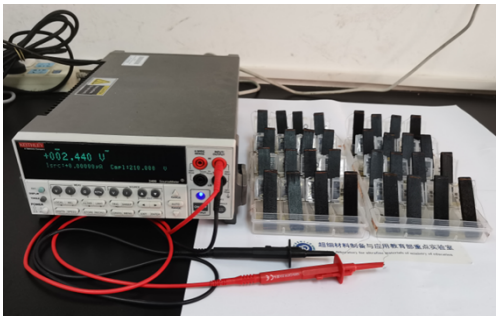

Fig. S13. The photograph of the 32 WHEGs system in series connections.

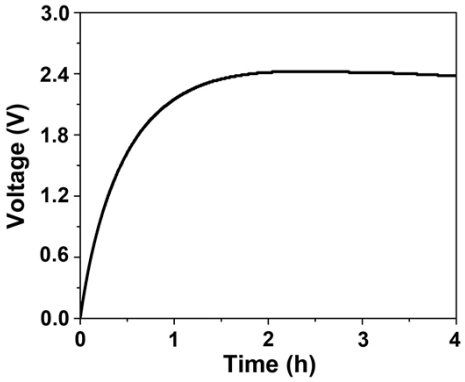

Fig. S14. The voltage curve of 10 capacitors charged by 32 WHEGs.

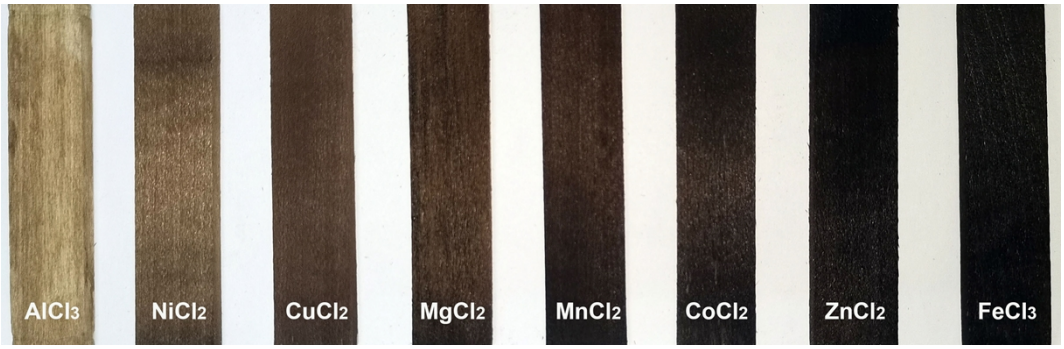

Fig. S15. Photograph of C-wood treated in different metal salts solution.

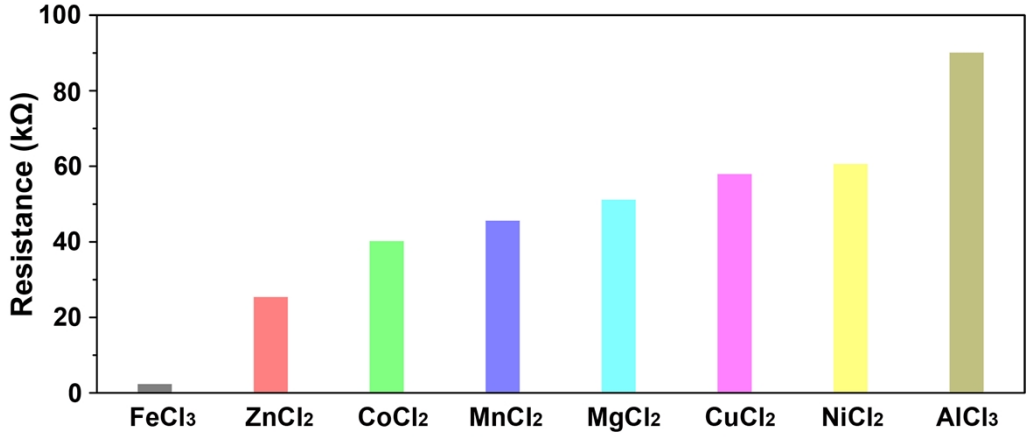

Fig. S16. Resistance of the WHEG obtaioned by various Lewis acid metal chlorides catalyzed carbonization.

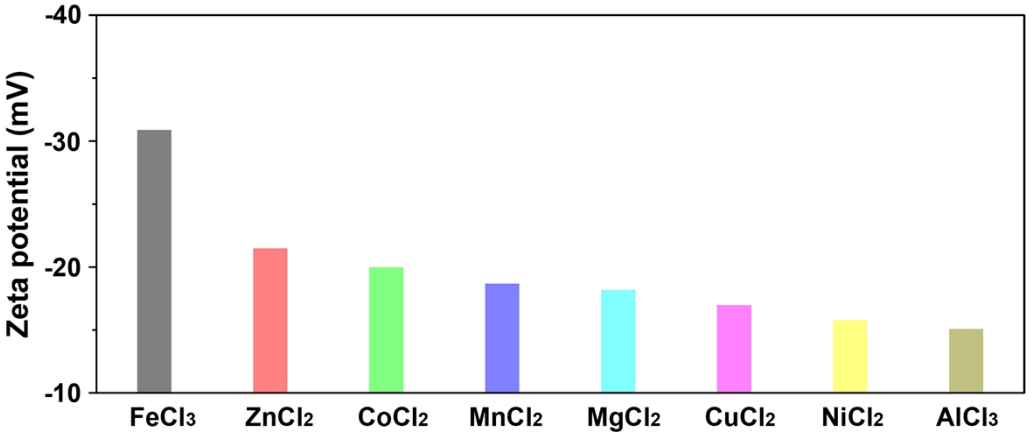

Fig. S17. Zeta potential in C-wood obtaioned by various Lewis acid metal chlorides catalyzed carbonization..

Part II: Supporting Tables

Table S1. The pH of different concentrations of $FeCl_3$ solution

$FeCl_3$ concentration	0	1 wt%	5 wt%	10 wt%	15 wt%
pH	6.21	1.66	1.10	0.77	0.55

Table S2. The summary information of electrical performance of different hydroelectric generation systems.

Material	Form of water	RH (%)	Voltage (mV)	Current (μA)	Reference
protein wires	moisture	50%	500	0.35	1
print paper	moisture	70%	250	0.015	2
PSS-PVA film	moisture	85%	600	2	3
MoS_2 film	moisture	80%	19	6.24	4
porous carbon film	moisture	>95%	68	0.003	5
MoS_2-SiO_2	liquid water		800	0.25	6
silk nanofibrils	moisture	99%	120	0.1	7
electrospun nanofiber fabric	moisture	99%	850	0.03	8
polymer nanowires	moisture	75%	143	0.413	9
biological nanofibrous	moisture	99%	110	0.03	10
carbonized wood	liquid water		96	10.5	This work

References

[1] X. M. Liu, H.Y. Gao, J. E. Ward, X. R. Liu, B. Yin, T. D. Fu, J. H. Chen, D. R. Lovley, J. Yao, *Nature*, 2020, **578**, 550-554.

[2] X. Gao, T. Xu, C. X. Shao, Y. Y. Han, B. Lu, Z. P. Zhang, L. T. Qu, *J. Mater. Chem. A*, 2019, **7**, 20574-20578.

[3] H. Y. Wang, H. H. Cheng, Y. X. Huang, C. Yang, D. B. Wang, C. Li, L. T. Qu, *Nano Energy*, 2020, **67**, 104238.

[4] D. R. He, Y. C. Yang, Y. Zhou, J. Y. Wan, H. A. Wang, X. Fan, Q. Li, H. H. Huang, *Nano Energy*, 2021, **81**, 105630.

[5] K. Liu, P. H. Yang, S. Li, J. Li, T. P. Ding, G. B. Xue, Q. Chen, G. Feng, J. Zhou, *Angew. Chem. Int. Ed.*, 2016, **55**, 8003-8007.

[6] S. G. Yoon, H. D. JIn, W. H. Lee, J. Han, Y. H. Cho, Y. S. Kim, *Nano Energy*, 2021, **80**, 105522.

[7] W. Q. Yang, L. L. Lv, X. K. Li, X. Han, M. J. Li, C. X. Li, *ACS Nano*, 2020, **14**, 10600-10607.

[8] Z. Y. Sun, L. L. Feng, C. D. Xiong, X. Y. He, L. M. Wang, X. H. Qin, J. Y. Yu, *J. Mater. Chem. A*, 2021, **9**, 7085-7093.

[9] N. Chen, Q. W. Liu, C. Liu, G. F. Zhang, J. Jing, C. X. Shao, Y. Y. Han, L. T. Qu, *Nano Energy*, 2019, **65**, 104047.

[10] M. J. Li, L. Zong, W. Q. Yang, X. K. Li, J. You, X. C. Wu, Z. H. Li, C. X. Li, *Adv. Funct. Mater.*, 2019, **29**, 1901789.