

Three dimensional high-performance micro-supercapacitors with switchable high power density and high energy density

Kuangbing Wang,^a Bangbang Nie,^{a,b,*} Ni Su,^c Benkun Lv,^d Huiqian Song,^a Guochen Qi,^{a,b} Yudong Zhang,^{a,b} Jingjiang Qiu,^{a,b} Ronghan Wei,^{a,b,e,*}

^aSchool of Mechanics and Safety Engineering, Zhengzhou University, Zhengzhou 450001, China

^bEngineering Technology Research Center of Henan Province for MEMS Manufacturing and Application, Zhengzhou University, Zhengzhou 450001, China

^cCollege of Chemistry, Zhengzhou University, Zhengzhou 450001, China

^dSchool of Electrical and Information Engineering, Zhengzhou University, Zhengzhou 450001, China

^eInstitute of Intelligent Sensing, Zhengzhou University, Zhengzhou 450001, China

Corresponding authors' e-mails: niebangbang@zzu.edu.cn; profwei@zzu.edu.cn

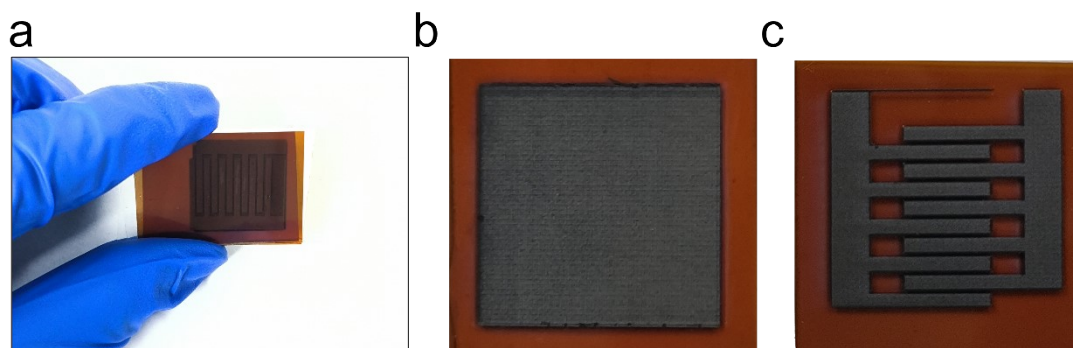


Fig. S1. (a) The image of switchable-MSC/MnO₂. (b) Square electrode. (c) Interdigital electrode.

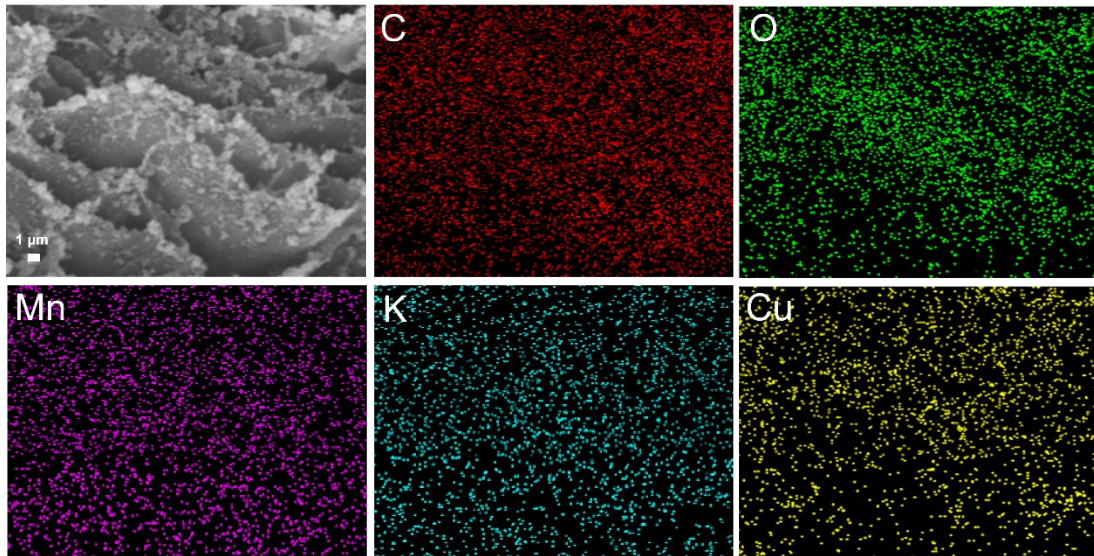


Fig. S2. The EDS image of LIG/MnO₂.

Table S1 The overall spectrum of the distribution charts for LIG/MnO₂.

| Element | Wt % | Atomic percentage (%) |
|---------|-------|-----------------------|
| C | 49.49 | 72.14 |
| Mn | 20.36 | 6.56 |
| O | 14.94 | 16.35 |
| Cu | 10.78 | 3.15 |
| K | 4.43 | 1.98 |
| Total | 100% | 100% |

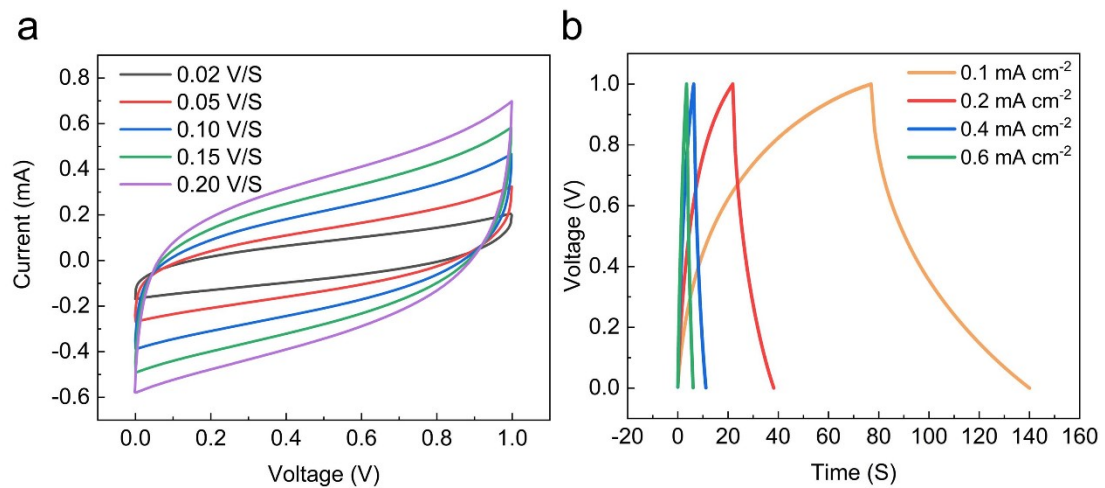


Fig. S3. Electrochemical characterizations of the interdigital-MSC. (a) CV curves under a scan rate of 0.02 to 0.2 V s⁻¹. (b) GCD curves under a charge-discharge rate of 0.1 to 0.6 mA cm⁻².

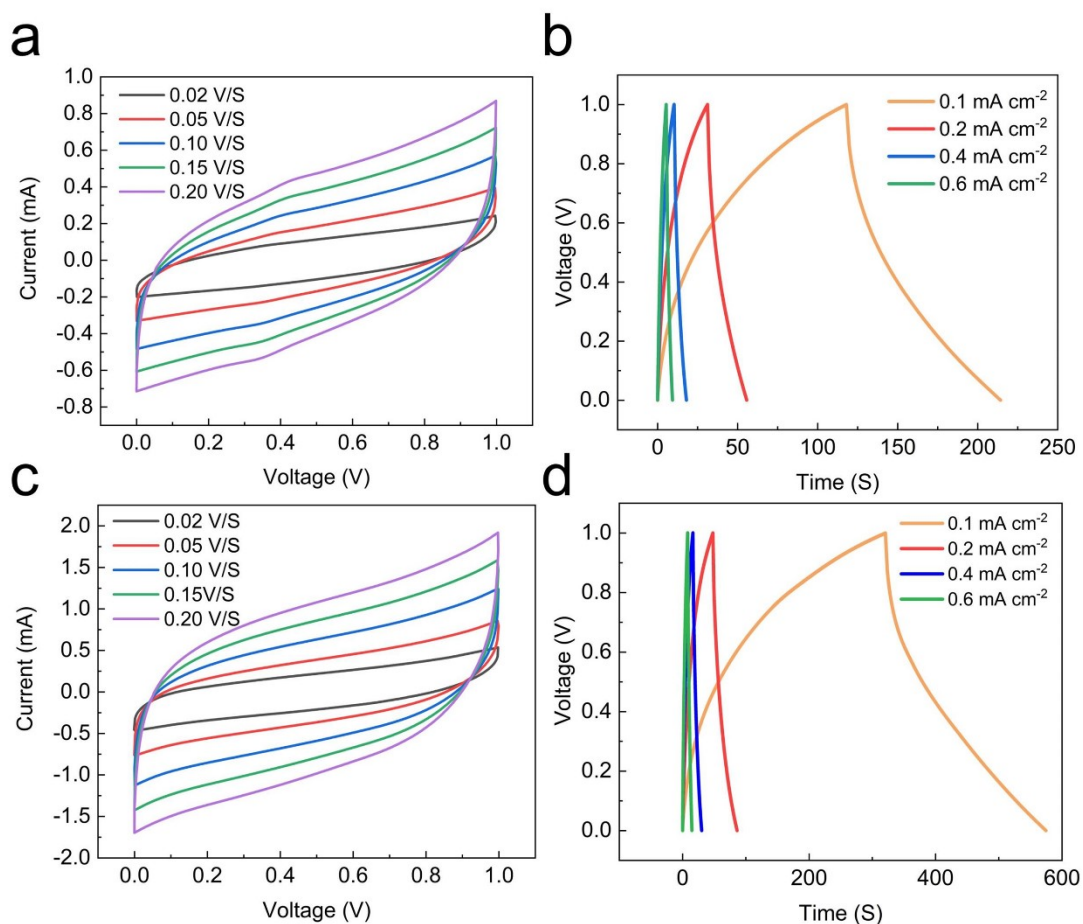


Fig. S4. Electrochemical characterizations of the switchable-MSC. (a, b) CV curves under a scan rate of 0.02 to 0.2 V s⁻¹ and GCD curves under a charge-discharge rate of 0.1 to 0.6 mA cm⁻² for the interdigital-MSC of the switchable-MSC. (c, d) CV curves under a scan rate of 0.02 to 0.2 V s⁻¹ and GCD curves under a charge-discharge rate of 0.1 to 0.6 mA cm⁻² for the sandwiched-MSC of the switchable-MSC.

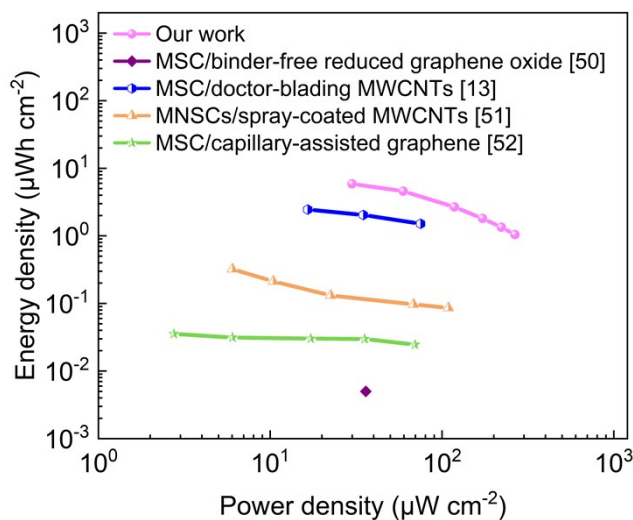


Fig. S5. Energy and power densities compared with most reported values for carbon-based MSCs.

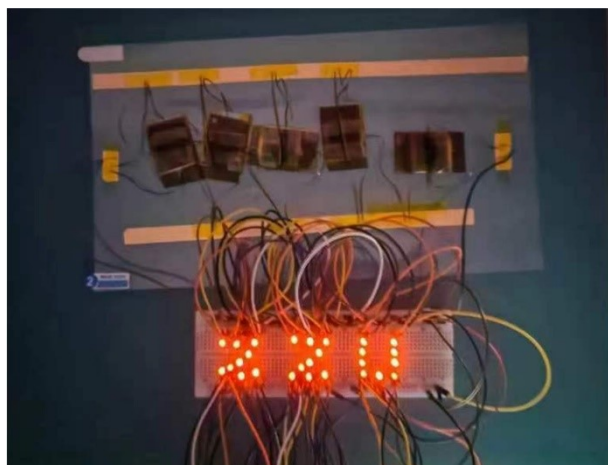


Fig. S6. Lighting up LED lights of 5 switchable-MSC/MnO₂ devices connected in series.