Electronic Supplementary Information

Self-powered Fluorescence Display Devices Based on a Fast Self-charging/recharging Battery (Mg/Prussian Blue)

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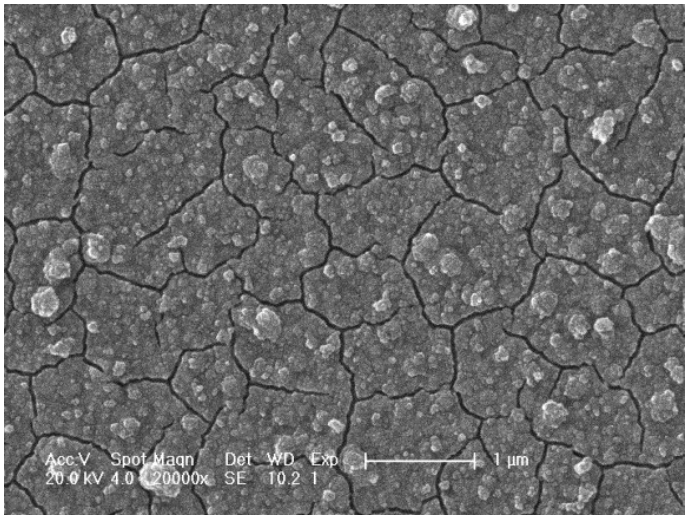

Fig. S1. The SEM of the PB prepared film.

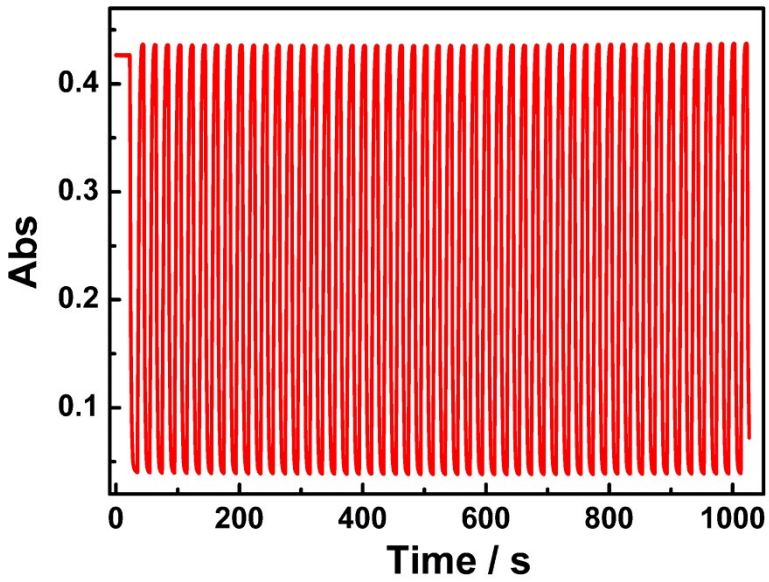

Fig. S2. Absorption (700 nm) response of the PB film versus time during consecutive switch cycles (0 V/0.4 V, 10 s) in 1 M KCl and 0.1 M phosphate buffer (pH 6) electrolyte solution.

When the PB film was subjected to repeated cyclic electroconversion, the absorbance change at 700 nm was monitored by absorption spectroscopy in situ. It is demonstrated that only 10 s was required to restore over 90% of the maximum absorbance variation. Moreover, the absorbance of PB was perfectly maintained with no sign of degradation after 50 test cycles, which indicated that this PB film was highly durable.

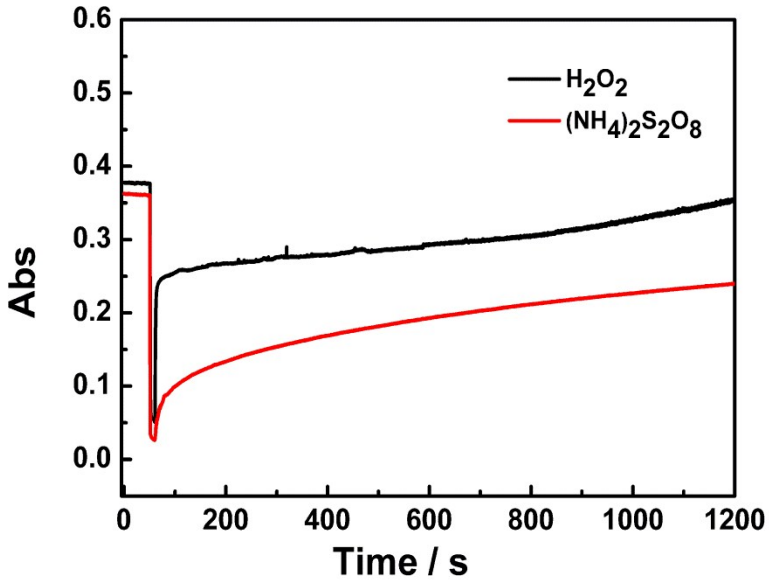

Fig. S3 In situ absorbance measurement of the Mg/PB battery connected at 50 s and then disconnected at 60 s. The red curve referred to the electrolyte containing 0.025 M $(NH_4)_2S_2O_8$, 1 M KCl and 0.1 M phosphate buffer (pH 6), and the black curve referred to the electrolyte containing 0.025 M H_2O_2, 1 M KCl and 0.1 M phosphate buffer (pH 6).

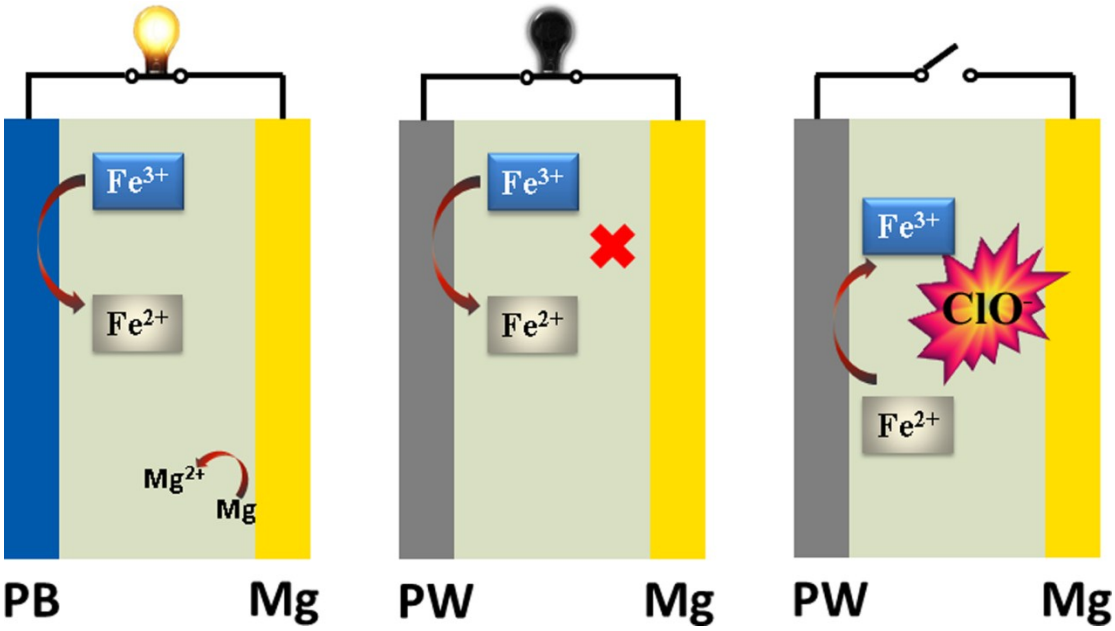

Fig. S4. The sheme of the Mg/PB battery.

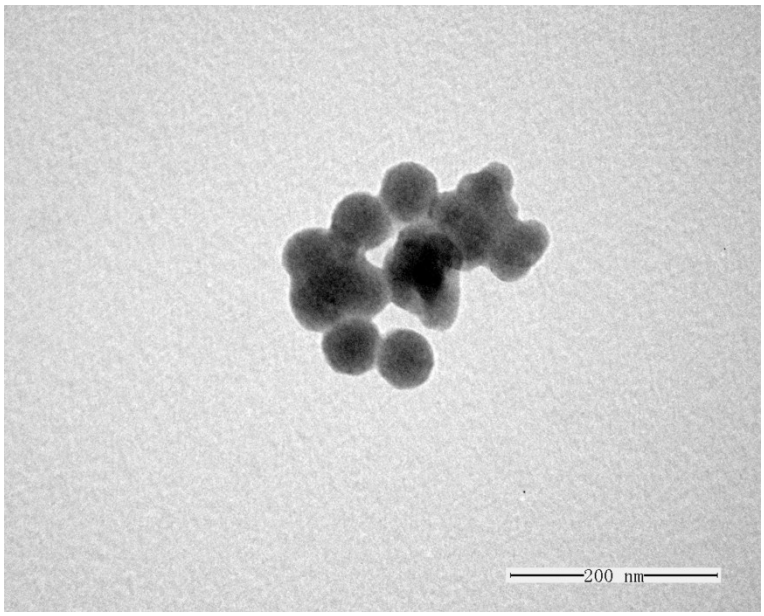

Fig. S5. TEM of the Ru@SiO_2 nanoparticle.

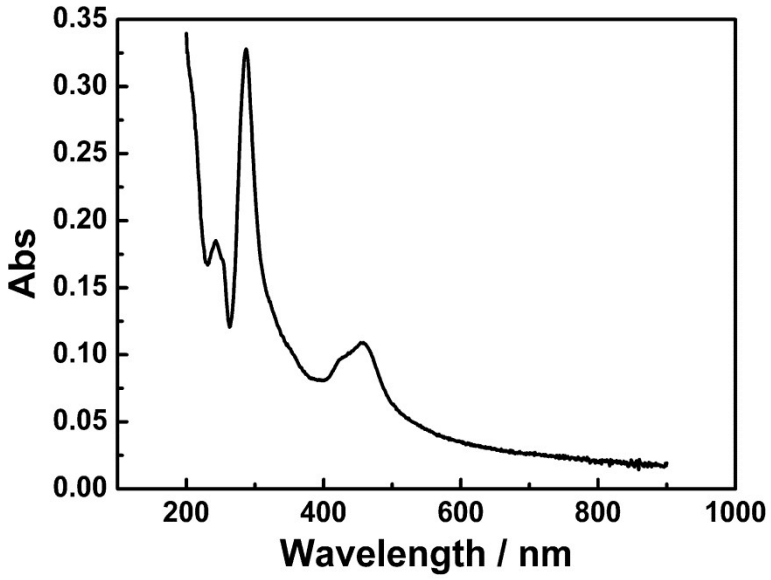

Fig. S6. Absorption spectra of Ru@SiO_2 aqueous solution (0.05 mg / mL).

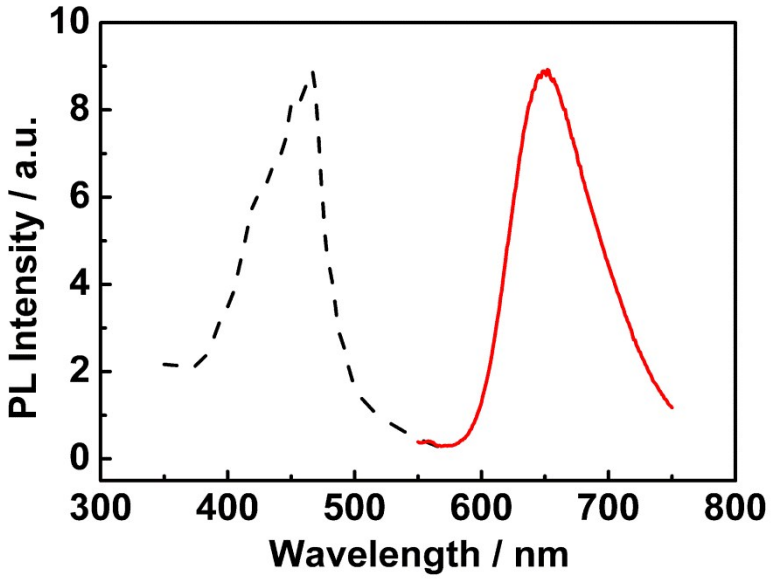

Fig. S7. Excitation (black dash curve) and emission (red solid curve) spectra of Ru@SiO_2 aqueous solution (0.1 mg / mL).

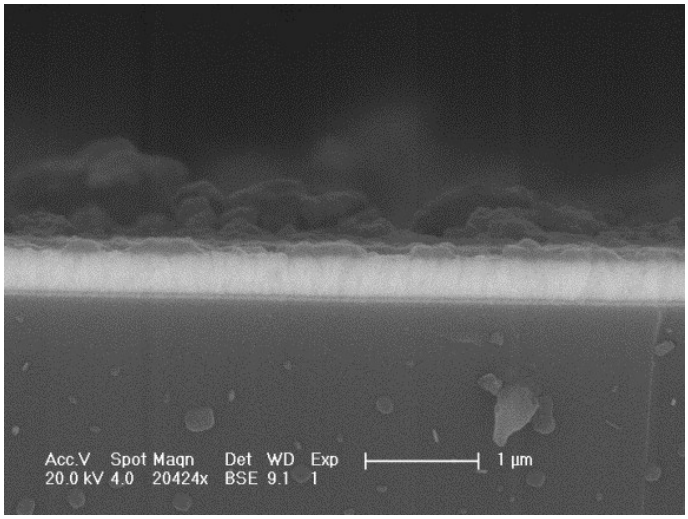

Fig. S8. The SEM of the section of the PB/Ru@SiO_2/Nafion film.

Table S1 Difference of battery behavior between the electrolyte with and without NaClO.

	Bleaching[#]	Colouration[#]	Anode Potential / V	Cathode Potential / V	Power Density / mW cm^{-2}
With NaClO	10 s, 95.1 %	6.2 min, 90 %	1.82	0.68	13.34
Without NaClO	10 s, 97.8 %	42.8 h, 82.7 %	1.78	0.37	3

[#] refer to the time required to achieve the given absorbance variation.

Table S2 Detailed information about Fig. 5.

Cycles	Connecting Time / s	Disconnecting Time / s	Fluorescence Contrast / %
1	15	290	63
2	15	350	63
3	15	390	54
4	15	395	52
5	15	490	52
6	15	465	51
7	15	525	47
8	15	710	45
9	15	600	44
10	15	660	39
11	15	805	39