Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting information

Multi-state Memristive Behavior in the Light-Emitting Electrochemical Cell

*Chien-Chung Shih, Chao-Wei Huang, Meng-yao Gao, Chu-Chen Chueh, and Wen-Chang Chen**

Department of Chemical Engineering, National Taiwan University, Taipei, 10617 Taiwan, E-mail: chenwc@ntu.edu.tw

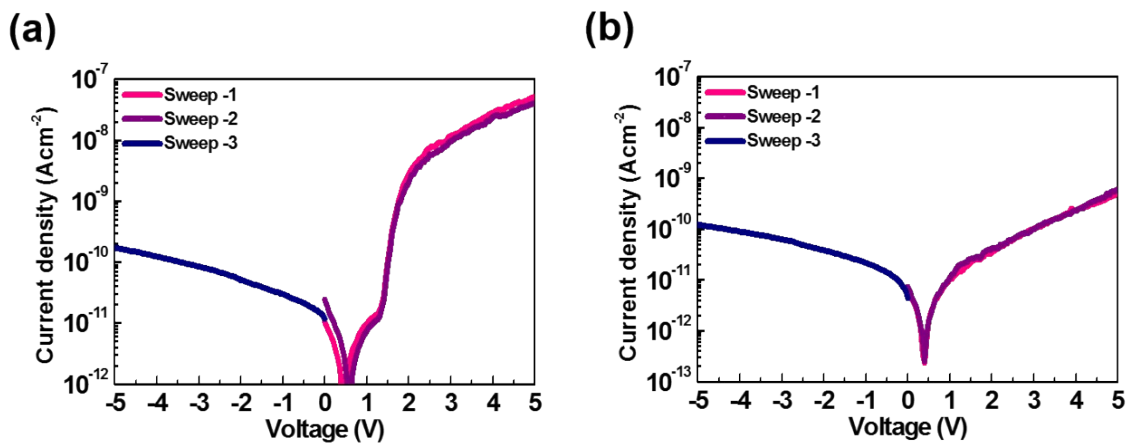

Figure S1. Current−voltage characteristics of the memory devices fabricated with (a) $(MEH\text{-}PPV)_{20}(MHPI)_4$-3 and (b) $(MEH\text{-}PPV)_{20}(MHPI)_6$-5 as the memory layer.

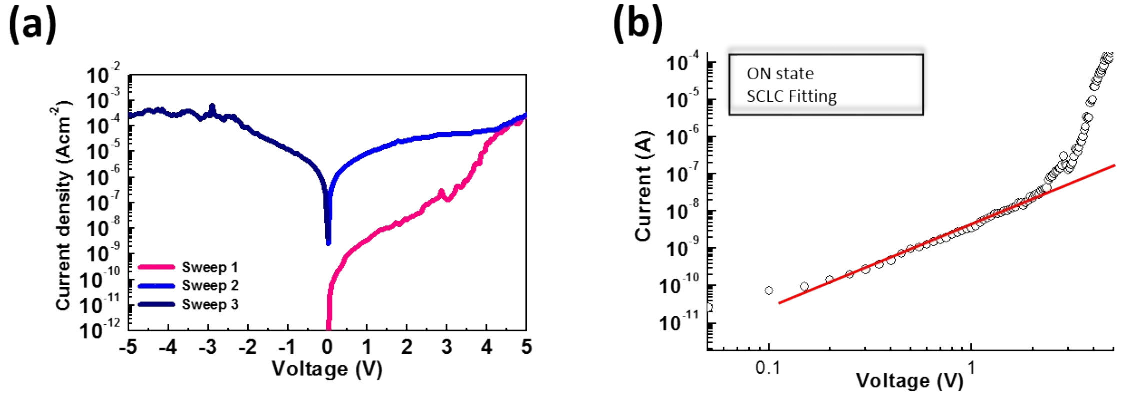

Figure S2. (a) Current−voltage characteristics of the memory device fabricated with a MH7-b-$PI_{3.8k}$ thin layer. (b) space-charge-limited current (SCLC) model fitting for the device.

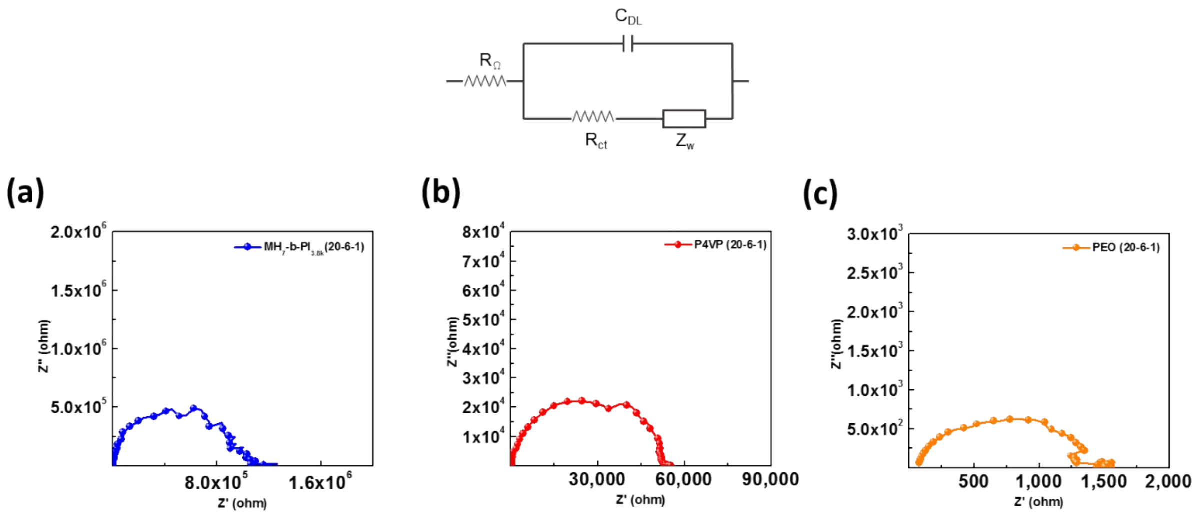

Figure S3. Impedance measurement for (a) $(MEH\text{-}PPV)_{20}(MHPI)_6$-1, (b) $(MEH\text{-}PPV)_{20}(P4VP)_6$-1, and (c) $(MEH\text{-}PPV)_{20}(PEO)_6$-1 in the frequency range of 20 Hz to 1 MHz, respectively. In Randles equivalent circuit, R_{Ω} represents the solution resistance, C_{DL} is the capacitance for the double layer charging process, Rct is the contact resistance contributing to the charge transfer resistance through the electrode-polymer interfaces, and Z_w is the Warburg impedance arising from the mass transfer process

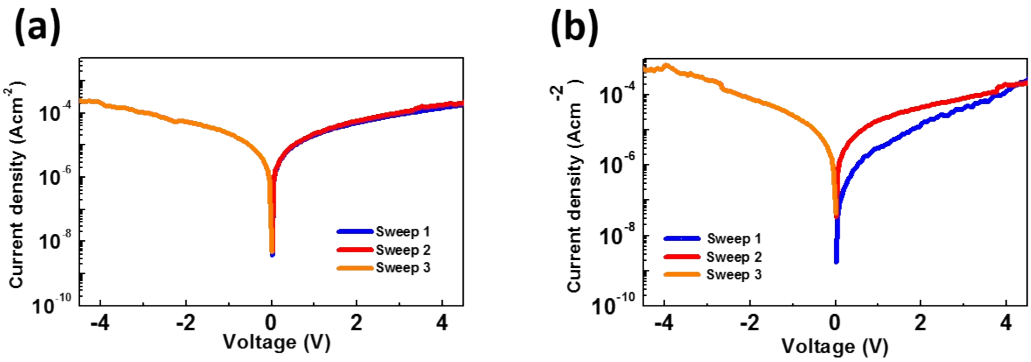

Figure S4. (a) Current–voltage characteristics of the memory devices fabricated with $(MEH\text{-}PPV)_{20}(PEO)_6$-1, and $(MEH\text{-}PPV)_{20}(P4VP)_6$-1 as the memory layer.

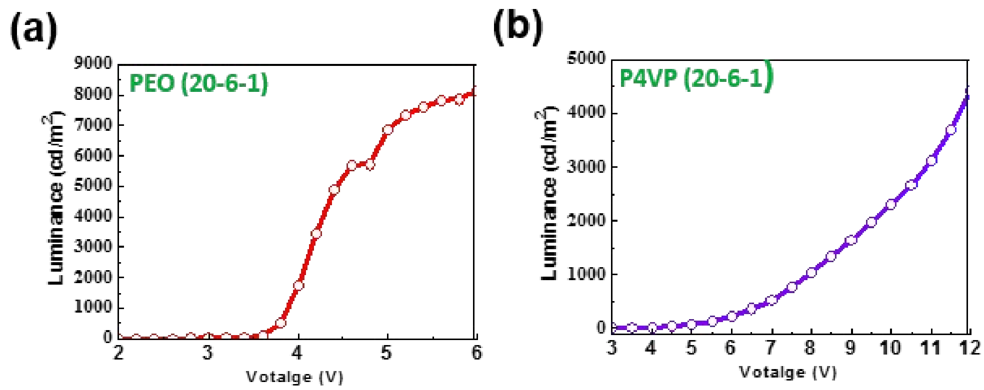

Figure S5. Optoelectronic properties for (ITO/memory layer /Al). The memory layer is a composite consisting of (a) $(MEH\text{-}PPV)_{20}(PEO)_6$-1 (b) $(MEH\text{-}PPV)_{20}(P4VP)_6$-1

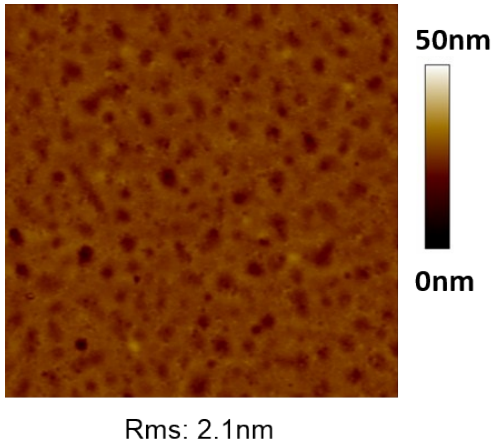

Figure S6. AFM image of the memory layer (MEH-PPV)$_{20}$(MHPI)$_{6}$-1 stored in the ambient condition after three months.

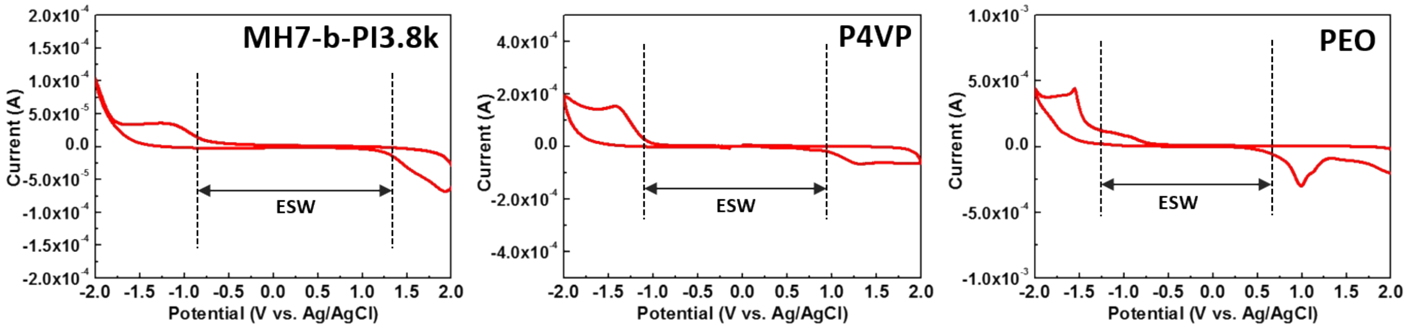

Figure S7. Cyclic voltammetry traces of MH7-b-PI$_{3.8k}$ P4VP and PEO.

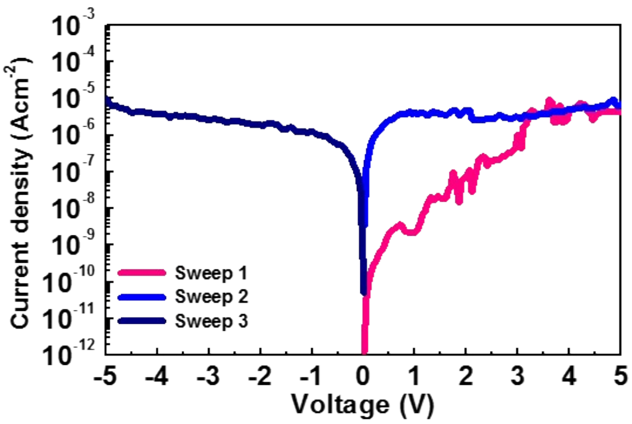

Figure S8. Current−voltage characteristics of a memory device fabricated with (MEH-PPV)$_{20}$(MHPI)$_6$-0 as the memory layer.

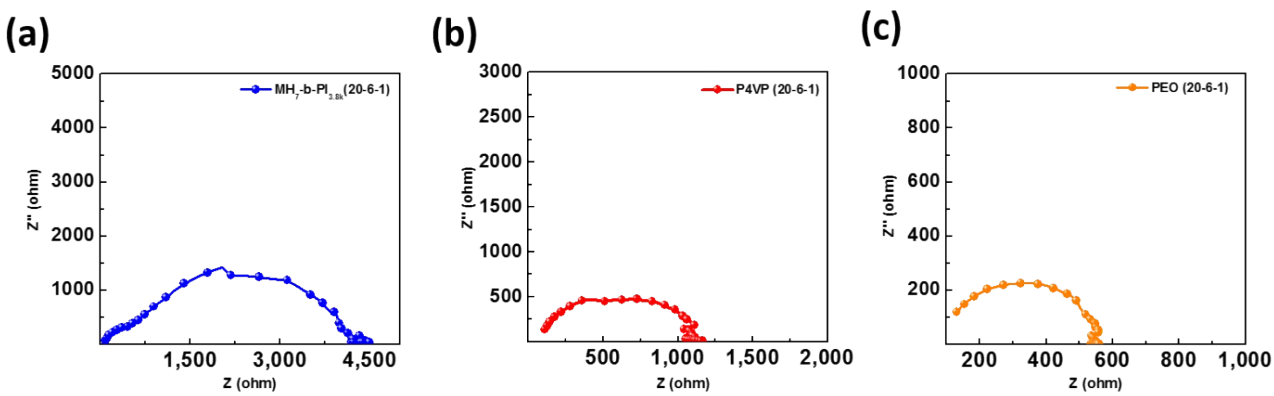

Figure S9. Impedance measurement for (a) (MEH-PPV)$_{20}$(MHPI)$_6$-1, (b) (MEH-PPV)$_{20}$(P4VP)$_6$-1, and (c) (MEH-PPV)$_{20}$(PEO)$_6$-1 after writing (5V charging, 3s), in the frequency range of 20 Hz to 1 MHz, respectively.

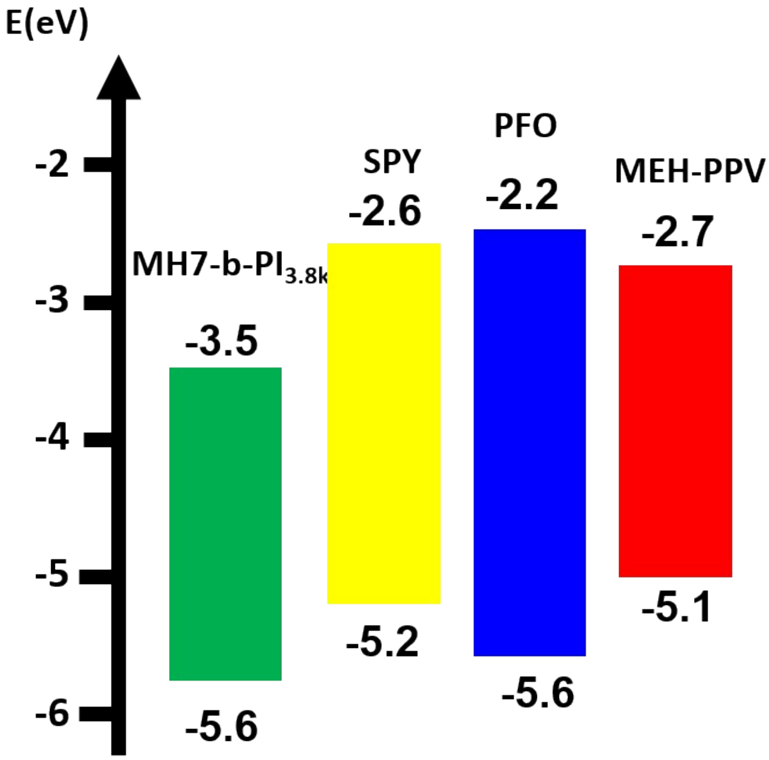

Figure S10. The energy levels for MH7-b-PI$_{3.8k}$ and light-emitters used in this study.