Electronic Supplementary Material (ESI) for Polymer Chemistry

Supplementary Information

Initiator-changed memory type: preparation of end-functionalized polymers by ATRP and study of their nonvolatile memory effects

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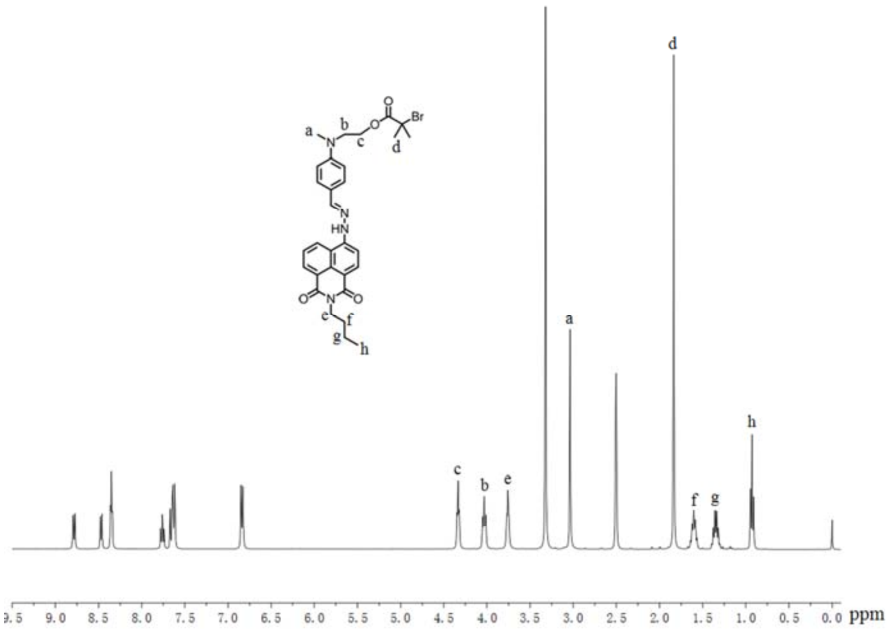


Fig. S1 ^{1}H NMR spectrum of NI.

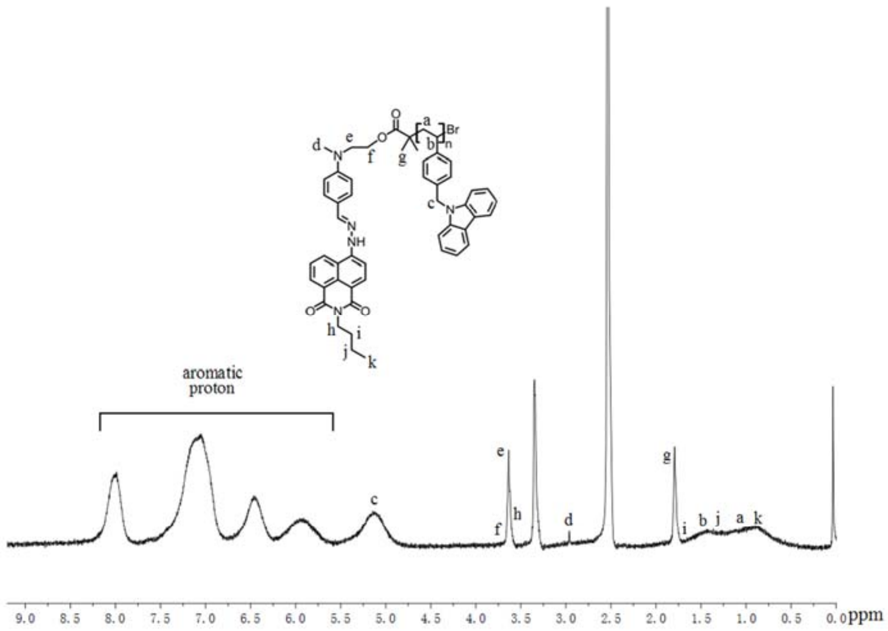


Fig. S2 ^{1}H NMR spectrum of NPVCz-1.

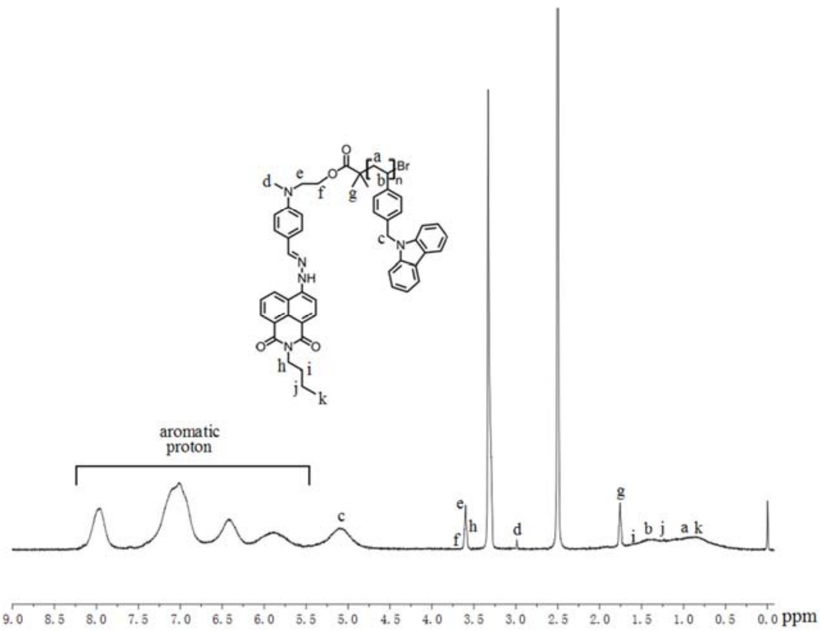


Fig. S3 ^{1}H NMR spectrum of NPVCz-2.

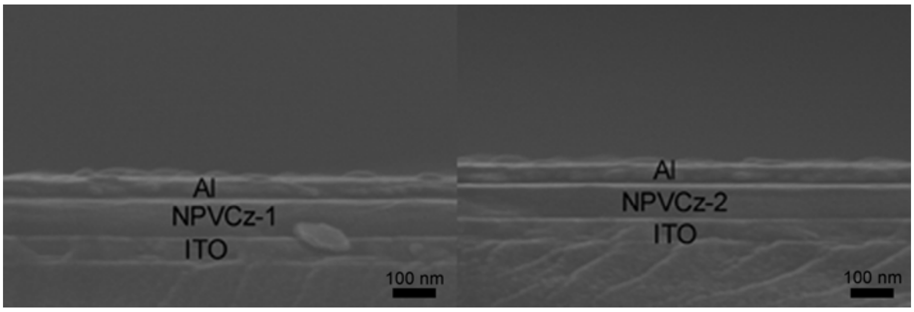


Fig. S4 SEM images of the cross sections of ITO/NPVCz-1 (100 nm)/Al device and ITO/NPVCz-2 (100 nm)/Al device.

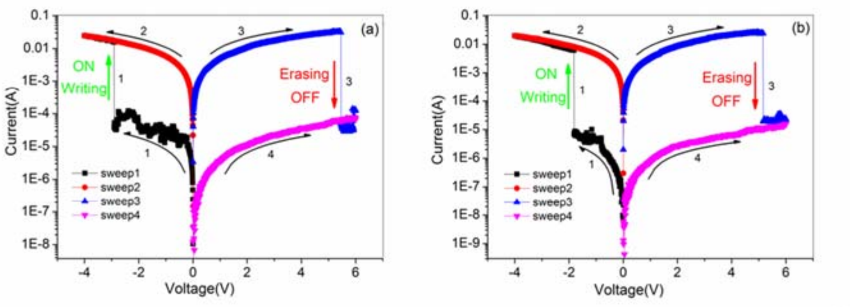


Fig. S5 (a) Current–voltage (I–V) characteristics of ITO/NPVCz-1/Al (dark) memory device; (b) Current–voltage (I–V) characteristics of ITO/NPVCz-2/Al (dark) memory device.

Table S1. The Cu contents in NPVCz-1 and NPVCz-2 determined by ICP-AES

Samples	ICP results of the Cu contents in NPVCz-1 and NPVCz-2
NPVCz-1	0.01 mg/L
NPVCz-2	0.03 mg/L

S6. Synthesis of TPVCz and fabrication of ITO/TPVCz/Al memory device.

TPVCz was synthesized by ATRP polymerization, using VCz (2 mmol) as monomer, tert-butyl 2-bromoisobutyrate (0.02 mmol) as macroinitiator, CuBr (0.04 mmol) as a catalyst, PMDETA (0.08 mmol) as a ligand. The polymerization was carried out at 100 °C in cyclohexanone (5 mL) under a nitrogen atmosphere for 24 h and was stopped by quenching the reaction mixture in the flask in ice water. After being diluted with THF, the diluted solution was passed through an alumina column to remove the copper catalyst. The crude polymers were precipitated in 200 mL of methanol under vigorous stirring. The crude polymers were purified by Soxhlet extractor with ethanol to remove excess monomers to get TPVCz. The fabrication method of ITO/TPVCz/Al memory device was similar with ITO/NPVCz/Al memory device. All electrical measurements of the device were characterized under ambient conditions.

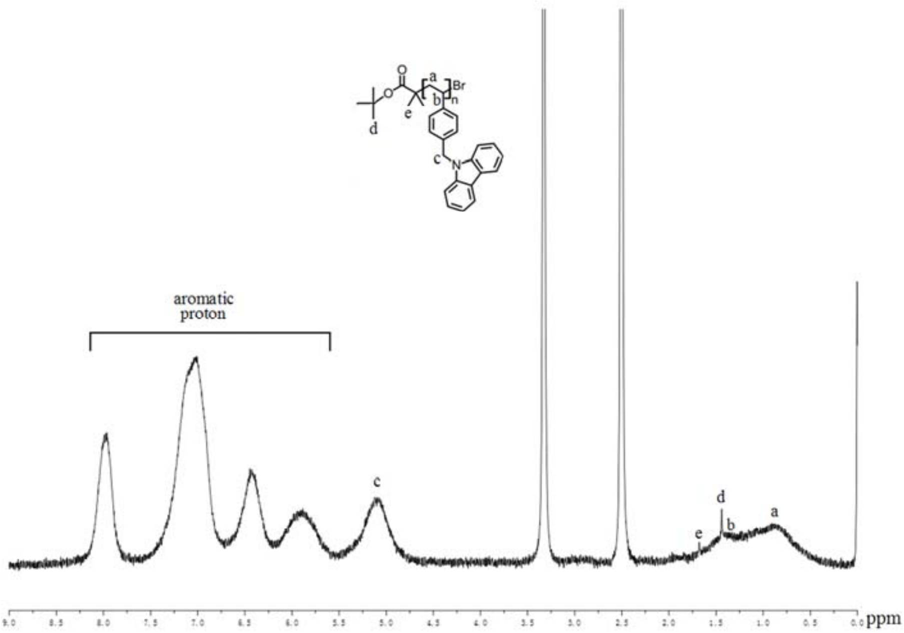


Fig. S6 ^{1}H NMR spectrum of TPVCz.

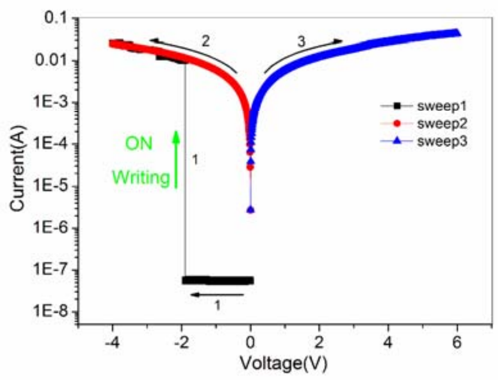


Fig. S7 Current–voltage (I–V) characteristics of ITO/TPVCz/Al memory device.

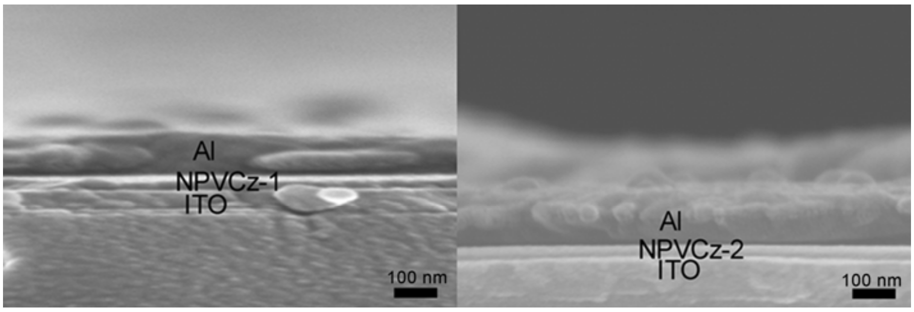


Fig. S8 SEM images of the cross sections of ITO/NPVCz-1 (30 nm)/Al device and ITO/NPVCz-2 (30 nm)/Al device.

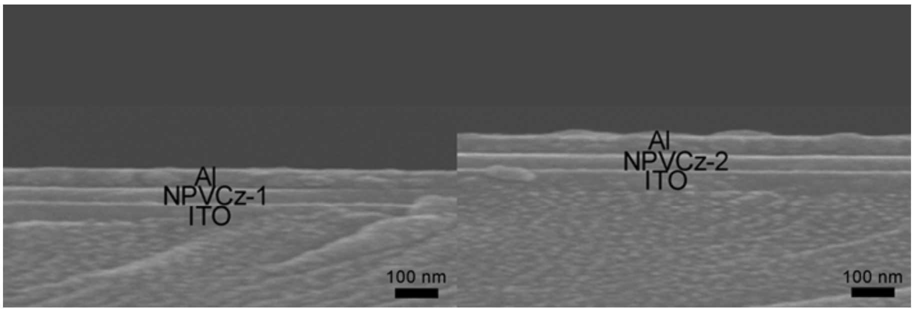


Fig. S9 SEM images of the cross sections of ITO/NPVCz-1 (50 nm)/Al device and ITO/NPVCz-2 (50 nm)/Al device.

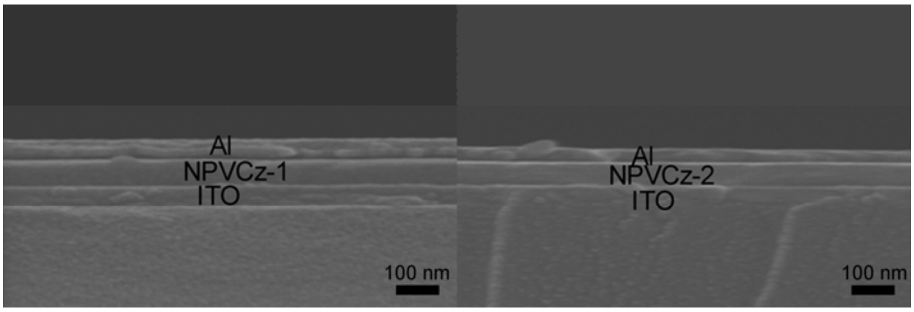


Fig. S10 SEM images of the cross sections of ITO/NPVCz-1 (70 nm)/Al device and ITO/NPVCz-2 (70 nm)/Al device.

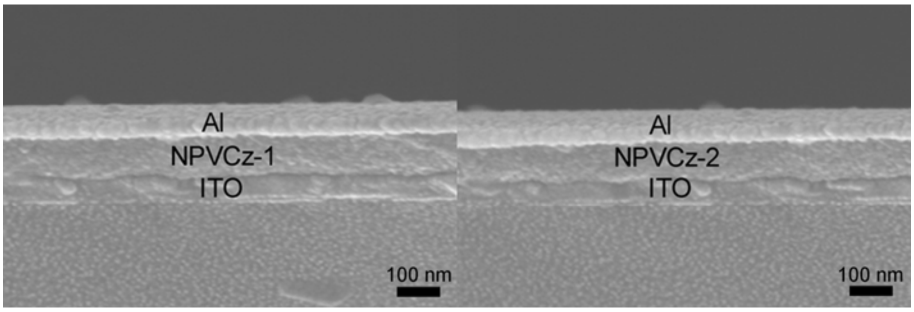


Fig. S11 SEM images of the cross sections of ITO/NPVCz-1 (120 nm)/Al device and ITO/NPVCz-2 (120 nm)/Al device.

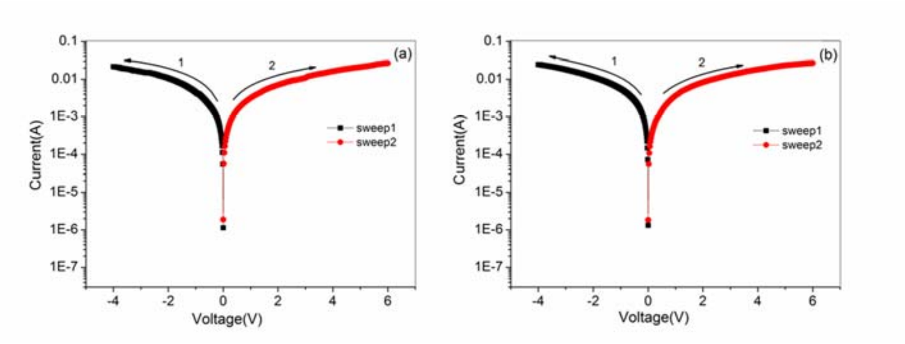


Fig. S12 (a) Current–voltage (I–V) characteristics of ITO/NPVCz-1 (30 nm)/Al memory device; (b) Current–voltage (I–V) characteristics of ITO/NPVCz-2 (30 nm)/Al memory device.

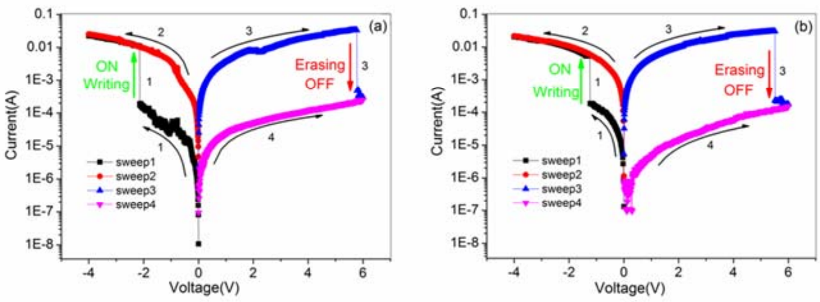


Fig. S13 (a) Current–voltage (I–V) characteristics of ITO/NPVCz-1 (50 nm)/Al memory device; (b) Current–voltage (I–V) characteristics of ITO/NPVCz-2 (50 nm)/Al memory device.

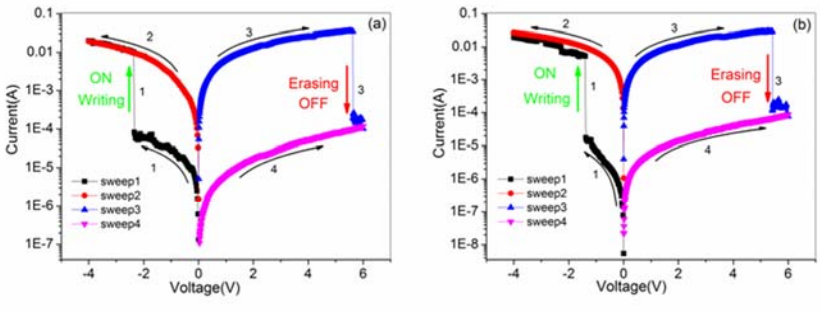
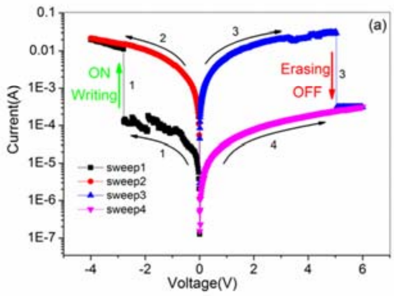


Fig. S14 (a) Current–voltage (I–V) characteristics of ITO/NPVCz-1 (70 nm)/Al memory device; (b) Current–voltage (I–V) characteristics of ITO/NPVCz-2 (70 nm)/Al memory device.



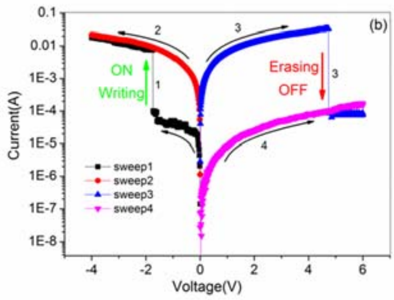


Fig. S15 (a) Current–voltage (I–V) characteristics of ITO/NPVCz-1 (120 nm)/Al memory device; (b) Current–voltage (I–V) characteristics of ITO/NPVCz-2 (120 nm)/Al memory device.

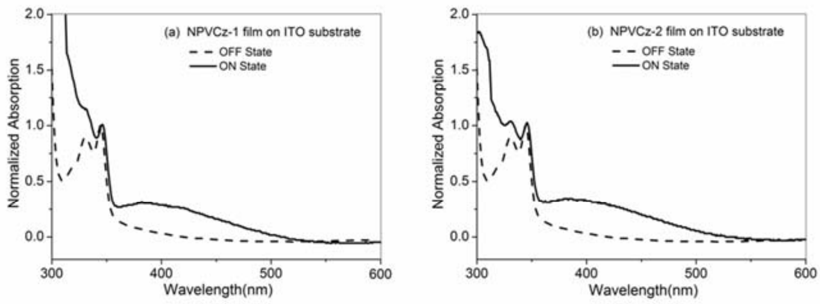


Fig. S16 (a) UV-visible absorption spectra of the NPVCz-1 film on ITO substrate in the OFF and ON states; (b) UV-visible absorption spectra of the NPVCz-2 film on ITO substrate in the OFF and ON states.