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Organic electrical bistable devices and applications as electronic digital memory¹

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Recently, organic electrical bistability has attracted considerable attention due to its potential applications as digital memory devices. In this presentation, we will present our recent study on organic electrical bistability phenomena and the application as nonvolatile memory devices (NVM). The bistability was discovered when a thin layer of metallic nano-particles introduced between two organic layers as the active cell, which interposed between two electrodes. We attribute this bistability to the charge transfer and trap in the metal nano-particles. A further material engineering by dispersing metal nano-particles and organic electron donor within polymer films as the active cell, it forms the polymer-based memory devices. When the metal nanoparticles are integrated with tobacco mosaic virus as the active cell, it forms a virus-based (or bio-based) memory device. Mechanism studies on the polymer and bio-based memory device reveal that charge-storage in the metal nanoparticles plays an important role in the device operation. Details of the mechanism study and the memory device performance will be discussed in this presentation.

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