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Nanostructural Patterning Improves the Performance of Nonvolatile Polymer Memory Devices SEUNG HYUN SUNG, BRYAN W. BOUDOURIS, Purdue University — Organic nonvolatile memory devices based on polymer ferroelectric materials are a promising approach toward the development of low-cost memory due to the ease of processing and flexibility associated with the device. Here, we focus on a memory device with a two-component active layer and a diode structure. This ferroelectric diode (FeD) has a nanostructured active layer, composed of ferroelectric and semiconducting polymers, and it can provide easy access to high-performance polymer-based memory devices. In order to create these nanostructured active layers, we have utilized electron beam (e-beam) lithography for the simple fabrication of a desired pattern on the ferroelectric polymer layer. Then, a semiconducting polymer was deposited into the nanoporous ferroelectric layer to complete the ordered heterojunction. By optimizing the nanostructure, the memory retention and ON/OFF current density ratio performance of FeD is greatly enhanced (*e.g.*, the ON/OFF ratio is a factor of 3 greater) over a traditional blended diode. This ability to control the ferroelectric polymer morphology will open new fields of evaluating in the relationships between structure and performance in organic memory devices.

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