Hybrid nanocomposites have been currently receiving considerable attentions because of their promising applications in next-generation nonvolatile memory devices and organic light-emitting devices (OLEDs) [1]. Nonvolatile memory devices and OLEDs fabricated utilizing hybrid nanocomposites have emerged as potential applications due to their simple fabrication and flexibility. Investigations on the enhancement of the device performance of the memories and OLEDs based on nanocomposites play an important role in promising applications in mobile devices. This paper present data for the fabrication and device performance of the nonvolatile memory devices and OLEDs based on nanocomposites. Current-voltage curves on the Al/CdSe/ZnS nanoparticles embedded in a hole-transporting poly(N-vinylcarbazole) (PVK) layer/indium-tin-oxide/glass device at 300 K showed a nonvolatile electrical bistability behavior. An abrupt increase of the current density above an applied voltage of 12 V for OLEDs containing of CdSe/ZnS QDs embedded in PVK was attributed to the existence of the QDs. While the electroluminescence (EL) peak of the OLEDs at low voltage range was related to the PVK layer, the EL peak of the OLEDs above 12 V was dominantly attributed to the CdSe/ZnS QDs. The luminance of the OLED with CdSe/ZnS QDs embedded in the PVK layer was significantly affected due to the existence of CdSe/ZnS QDs in the EML. Device characteristics of the nonvolatile memory devices and OLEDs fabricated utilizing various nanocomposites were described. The carrier transport mechanisms of the fabricated memory devices and OLEDs are described on the basis of the experimental results. This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MEST) (No. 2010-0018877). 1. D. I. Son, T. W. Kim, J. H. Shim, J. H. Jung, D. U. Lee, J. M. Lee, W. I. Park, and W. K. Choi, Nano Lett. 10, 2441 (2010).