Bistable Organic Nano-Floating Gate Memory Devices Based on Cobalt Ferrite Nanoparticles

정지형, 김성환[1], 김현중[1], 박종남[1], 오준학†
포항공과대학교; [1]울산과학기술대학교
(joonhoh@postech.ac.kr†)

Transistor-type nano-floating gate memory (NFGM) devices use nanostructured materials as charge trap sites. They have attracted great interest because of their suitability as platforms for integrated circuits and their excellent memory properties with inexpensive fabrication processes, which make them highly promising for the next-generation data storage devices. Herein, we report novel nonvolatile NFGM devices utilizing cobalt ferrite ($CoFe_2O_4$) nanoparticles (NPs) as the charge trap sites with pentacene as a *p*-type semiconductor on a flexible and transparent polymer substrate as well as on a conventional silicon wafer. $CoFe_2O_4$ NP-based memory devices exhibit excellent memory characteristics including a large memory window, fast and reversible switching behaviors, high read current ON/OFF ratio, and outstanding data retention capability due to the outstanding electron trap/release capability of $CoFe_2O_4$ NPs and the oleate layer surrounding NPs which acts as an alternative tunneling dielectric layer. Our findings demonstrate a viable way for the fabrication of highly flexible and wearable memory devices.