

Cell Characteristics of a Multiple Alloy Nano-Dots Memory Structure

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A multiple alloy metal nano-dots memory using FN tunneling was investigated in order to confirm its structural possibility for future flash memory. In this work, a multiple FePt nano-dots device with a high work function (~ 5.2 eV) and extremely high dot density ($\sim 1.2 \times 10^{13}/\text{cm}^2$) was fabricated. Its structural effect for multiple layers was evaluated and compared to one with a single layer in terms of the cell characteristics and reliability. We confirm that MOS capacitor structures with 2 - 4 multiple FePt nano-dot layers provide a larger threshold voltage window and better retention characteristics. Furthermore, it was also revealed that several process parameters for block oxide and inter-tunnel oxide between the nano-dot layers are very important to improve the efficiency of electron injection into multiple nano-dots. From these results, it is expected that a multiple FePt nano-dots memory using Fowler-Nordheim (FN)-tunneling could be a candidate structure for future flash memory.