

## An Reliable Non-Volatile Memory using Alloy Nano-Dots Layer with Extremely High Density

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New non-volatile memory with high density and high work-function metal nano-dots, MND (Metal Nano-Dot) memory, was proposed and fundamental characteristics of MND capacitor were evaluated. In this work, nano-dot layer of FePt with high density and high work-function ( $\sim 5.2\text{eV}$ ) was fabricated as a charge storage site in non-volatile memory, and its electrical characteristics were evaluated for the possibility of non-volatile memory in view of cell operation by Fowler-Nordheim (FN)-tunneling. Here, nano-dot FePt layer was controlled as a uniform single layer with dot size of under  $\sim 2\text{nm}$  and dot density of  $\sim 1.2 \times 10^{13}/\text{cm}^2$ . Electrical measurements of MOS structure with FePt nano-dot layer shows threshold voltage window of  $\sim 6\text{V}$  using FN programming and erasing, which is satisfied with operation of the non-volatile memory. Furthermore, this structure provides better data retention characteristics compared to other metal dot materials with the similar dot density in our experiments. From these results, it is expected that this non-volatile memory using FePt nano-dot layer with high dot density and high work-function can be one of candidate structures for the future non-volatile memory.