엔지니어드 터널베리어 메모리 적용을 위한 HfO_2 층의 전하 트랩핑 특성

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Charge trapping characteristics of high-k HfO_2 layer for tunnel barrier engineered nonvolatile memory application

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Abstract : It is desirable to choose a high-k material having a large band offset with the tunneling oxide and a deep trapping level for use as the charge trapping layer to achieve high P/E (Programming/erasing) speeds and good reliability, respectively. In this paper, charge trapping and tunneling characteristics of high-k hafnium oxide (HfO_2) layer with various thicknesses were investigated for applications of tunnel barrier engineered nonvolatile memory. A critical thickness of HfO_2 layer for suppressing the charge trapping and enhancing the tunneling sensitivity of tunnel barrier were developed. Also, the charge trap centroid and charge trap density were extracted by constant current stress (CCS) method. As a result, the optimization of HfO_2 thickness considerably improved the performances of non-volatile memory (NVM).

Key Words : high-k material, tunnel barrier engineered nonvolatile memory, centroid, constant current stress