

Non-linear Resistive Switching Characteristic of ZnSe Selector Based HfO₂ ReRAM Device for Eliminating Sneak Current

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The non-linear characteristics of ON states are important for the application to the high density cross-point memory industry because the sneak current in neighbor cells occurred during reading, erasing, and writing process. K_w of above 20 in ON states, which is the writing current @ V_{write} /the current @ $1/2V_{write}$, was required in cross-point ReRAM memory industry. The high current density non-linear IV curve of ZnSe selector was shown and the ALD HfO₂ switching device has the linear properties of ON states and the compliance current of 100 μ A. To evaluate the performance of the selection device, we connected it to HfO₂ switching device in series. The bottom electrode of the selection device was connected to the top electrode of the RRAM. All of the bias was applied with respect to the top electrode of the selection device, whereas the bottom electrode of the RRAM was grounded. In the cross-point application, $1/2V_{write}$ and $-1/2V_{write}$ were applied to the word-line and bit-line, respectively, which were connected to the selected cell, and a zero bias was applied to the unselected word-lines and bit-lines. The current @ $1/2V_{write}$ of the unselected cells was blocked by the selection device, thus eliminating the sneak path and obtaining a writing voltage margin. Using this method, the writing voltage margin was analyzed on the basis of the memory size.

Keywords: ReRAM, Selector, Non-linear, Sneak current

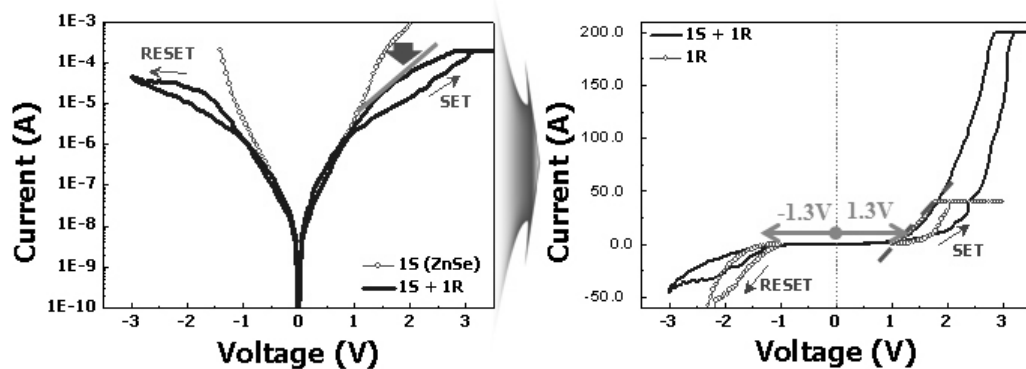


Fig. 1.

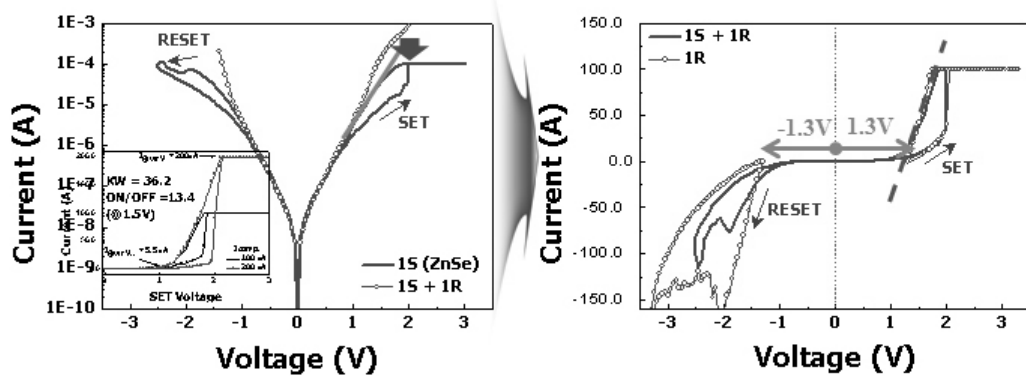


Fig. 2.