

## Optimization of HfO<sub>2</sub> Deposition of Cu Electrode-Based RRAM Device

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**Abstract :** Recently, the merits such as simple structure, low power consumption, and compatibility with complementary metal oxide semiconductor (CMOS) process give an advantage of resistive random access memory (RRAM) as a promising candidate for the next generation memory. hafnium dioxide (HfO<sub>2</sub>) has been widely studied as an oxide layer material, but the use of copper (Cu) as both top and bottom electrodes has rarely been studied. In this study, radio frequency sputtering was used to deposit the intermediate layer HfO<sub>2</sub>, and electron beam evaporation was used. For the upper and lower electrodes (Cu), using different Ar: O ratios, we found that the control of the metal filament will make the filament widely distributed, causing the current to rise to the limit current during Reset. However, if the flow ratio is controlled well, the ON/OFF ratio can reach 10<sup>4</sup>, and the set voltage is controlled below 3V.

**Keywords :** RRAM, metal filament, HfO<sub>2</sub>, Cu electrode

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