Current Status of Mechanism Elucidation of Resistive Switching Effect in Resistive Random Access Memory (ReRAM)

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Resistive random access memory (ReRAM) technology developed rapidly in this decade, after sensational reports on great performances of ReRAM as a candidate for the Flush substitution by Zhang et al. in 2002 [1] and by Baek et al. in 2004 [2]. However, in fact, 50 years has passed after the early reports on negative resistance and resistive switching phenomena in metal oxides [3-6]. They even include the proposals of filament model [4,5] and the suggestion that electrochemical effect plays an important role in the resistive switching effect [6], which are widely received nowadays. We also devoted ourselves to the mechanism elucidation [7], the performance optimization [8], and even the development of new application [9] of ReRAM in this decade.

In this paper, we briefly review the history of researches on ReRAM and summarize the current status of understanding of resistive switching mechanism. In the light of accumulated knowledge and our own experience of ReRAM research, we will discuss what we should do in the coming decade.