

Resistive Switching Characteristics of Tantalum Oxide Thin Film and Maghemite Nanoparticles Hybrid Structure

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Extended Abstract

The conduction mechanism is an essential study in the resistive switching memory device. Reportedly, tantalum oxide shows good resistive switching characteristics (Lee et al., 2011). Furthermore, as iron oxide nanoparticles also show bipolar and analog switching characteristics (Lee et al., 2012; Kim et al., 2013) from these hybrid structures we can get more effective resistive switching characteristics for the memory devices applicable for neuromorphic systems.

In our study, the device of Ti/Fe₂O₃/TaO_x/Pt was fabricated. The hybrid structure consists of tantalum oxide thin film deposited by sputtering and Fe₂O₃ (maghemite) nanoparticle layer. The nanoparticles were chemically synthesized and assembled on tantalum oxide by dip-coating steps. The phase change between Fe₂O₃ and Fe₃O₄ will facilitate the resistance switching.

The comparison of switching characteristics between tantalum oxide layer and hybrid structure will be presented. The applicability of the results to neuromorphic system is also discussed.

References

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