Abstract #3, 223rd ECS Meeting, © 2013 The Electrochemical Society

Effect of Electrode Material on Resistive Switching Characteristics in TaON Nonvolatile Memory Devices

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The effects of electrode material on the resistive switching properties of TaON thin films were investigated in this letter. The memory cells composed of Pt/TaON/TiN reveals the bipolar switching behavior that shows excellent resistance ratio of 10^2 with switching operations over 100 DC cycles. The formation/disruption of conducting filaments by oxygen anions migration near/at the TiN electrode was applied to explain the resistance switching behavior. In comparison with Pt/TaON/TiN device, the Cu/TaON/TiN device exhibits reversed bipolar resistive switching characteristic. The switching mechanism of Cu/TaON/TiN device is regarded as the Cu cation redox and migration in the TaON film to form the conduction filaments. The switching layer is located near/at the Cu electrode. Furthermore, the setting voltage of the Cu/TaON/TiN device is lower than that of the Pt/TaON/TiN device due to the confined conduction path by Cu filaments.