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X-ray Photoelectron Spectroscopy를 이용한 양극 산화된 Ni/Ti 박막의 저항 스위칭 특성에 대한 분석

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We present bias-polarity dependent resistive switching characteristics in Ni–Ti Oxide thin films grown by anodizing Ni film on a Ti/SiO2/Si substrate. Very clear resistance switching I-V characteristics are observed as shown in Fig. 1. SEM is used to study the structural properties as a function of anodizing time. To understand the mechanism responsible for the bias-polarity dependent resistance switching, depth profiles of X-ray photoelectron spectroscopy (XPS) are measured for different resistance-states, high-resistance off and low-resistance on states. In the initial state before forming, there are main three bonding state peaks, NiTi, TiO2, and NiOx. However, after forming whilst the intensity of bonding state peaks for NiTi and TiO2 decreases that for NiOx increases. In the high-resistance off (like the initial state) and low resistance on (like the state after forming) states show a similar behavior. Thus, broken bonding states of Ni-Ti & Ni-O structures are created producing metallic Ni defects and titanium oxide structures. As a result, metallic Ni defects in the oxide film are believed to play a crucial role in creating the low resistance conduction path. We present a simple model to explain the resistance switching mechanism.