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Improvement in resistive switching properties of NiO thin films using ion beam treatment YEON SOO KIM, KonKuk Univ, SUNG MOON HWANG, Sejong Univ, JIHOON JEON, YOON SEUNG NAM, SANGIK LEE, CHAN SOO YOON, KonKuk Univ, TAEKJIB CHOI, Sejong Univ, BAE HO PARK, KonKuk Univ, OXIDE THIN FILM DEVICE LAB TEAM, HYBRID MATERIALS RESEARCH CENTER COLLABORATION — Resistive switching phenomena have attracted much interest due to its potential application for next generation non-volatile memory. Although many researches have been conducted for real application, their some drawbacks, such as poor operation voltage distribution, are remained as critical obstacles. To solve the problems by finding their switching phenomena the filament formation/rupture hypothesis is widely used, however, microscopic mechanisms are still veiled. We deposited NiO thin films with reactive dc magnetron sputter on Pt/Ti/SiO_2/Si substrates at 500 °C. Various sized patterns were fabricated by using photolithography, and then Pt electrodes were deposited. These structures show typical unipolar resistive switching behaviors. Before depositing top electrodes, we have treated NiO surface by using Ar^+ ion beams with various conditions. Although Ar^+ ion bombardment did not cause obvious thickness change of the film, fundamental properties of the Pr/NiO/Pt capacitor such as breakdown voltage have been drastically changed. We believe that variations of nickel-oxygen bonding in the vicinity of NiO surface played important roles in such changes and thus optimized Ar^+ ion bombardment condition would improve resistive switching properties.

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