

## Role of post annealing and plasma treatment in enhancing resistance changing characteristics of $\text{Pr}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$ film

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The PCMO( $\text{Pr}_{0.7}\text{Ca}_{0.3}\text{MnO}_3$ ) film based metal-insulator-metal (MIM) devices showed a resistance-switching behavior. The resistance changing of PCMO film with SRO buffer layers deposited by using rf-magnetron sputtering system. The ratio of the resistance changing of the PCMO film with SRO buffer layers in the high-resistance state to that in the low-resistance state turned out to be much larger than that of the PCMO film without SRO buffer layers. The ER ratio (defined as the ratio of  $\Delta R/R = (R_{\text{high}} - R_{\text{low}})/R_{\text{low}}$ ) of PCMO film with the buffer layers is over 2000% at maximum. When post-annealing in  $\text{O}_2$  atmosphere for 2 hours after depositing SRO/PCMO/SRO, ER ratio showed improvement. It is thought that the  $\text{O}_2$  post annealing seems to the increment of oxygen contents and defects in the PCMO film and SRO films. As a result of surface treatment by using  $\text{O}_2$  plasma through surface of PCMO and SRO films, resistance change of unstable film was changed stably. And the reproducibility of the sample's resistance switching characteristics increased. Origin of resistance change is not clear, but PCMO film with SRO buffer layers have the possibility of application for non volatile memory device.