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Ferroelectric-resistive switching effect in $BiFeO_3$ nano-islands TAEKJIB CHOI, Hybrid Materials Research Center & Faculty of Nanotechnology and Advanced Materials Engineering, Sejong University, Seoul 143-747, Korea, JI HOON JEON, Division of Quantum Phases and Devices & Department of Physics, Konkuk University, Seoul 143-701, Korea, YUNSEOK KIM, School of Advanced Materials Science & Engineering, Sungkyunkwan University, Suwon 440-746, Korea, SERGEI V. KALININ, The Center for Nanophase Materials Sciences, Oak Ridge National Laboratory, Oak Ridge, TN 37831, BAE HO PARK, Division of Quantum Phases and Devices & Department of Physics, Konkuk University, Seoul 143-701, Korea — Recent investigations into various ferroelectric materials have revealed remarkable polarization dependent electronic transport properties. These properties include a significant electroresistance changes in a switchable ferroelectric diode and ferroelectric tunnel junctions However, ferroelectric nanostructures such as nano-islands and nanowires have not yet been exploited for ferroelectric-resistive memories In this presentation, we explore the local charge conductions and their coupling with ferroelectric polarization in highly ordered ferroelectric $BiFeO_3$ nano-islands array by using conductive atomic force microscopy and piezoresponse force microscopy. We observed a switchable diode effect in $BiFeO_3$ nano-islands grown on $SrRuO_3/SrTiO_3$ substrate The ratio of resistive on/off had a value of $\sim$ 753, reading with a voltage as low as $\sim$ 0.5 V These results suggest that ferroelectric nanostructures as a potential candidate for ferroelectric–resistive memory elements can provide higher resistive on/off ratio, lower power consumption and large capacity.

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