Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Modulation of ferroelectricity and resistance switching in $SrTiO_3$ films[1] FANG YANG, WEIHUA WANG, JIANDONG GUO, Beijing National Laboratory for Condensed Matter Physics Institute of Physics, Chinese Academy of Sciences — $SrTiO_3$ has remarkable dielectric property; it also exhibits ferroelectricity in thin films with strain or defects. It is expected that modulation of its ferroelectricity and electricity is potential in oxide electronics. The nonstoichiometry $SrTiO_3$ thin films with different cation concentrations were prepared on Si (001) substrates. Piezoresponse force microscopy measurements show that those films with Sr deficiency display obvious ferroelectricity. The scanning transmission electron microscopy results show that there are interstitial Ti atoms in the unit cells. Polar defect pairs can be formed by the interstitial Ti atoms and Sr vacancies along [100] or [110] direction. Such antisitelike defects observed in $SrTiO_3$ films are considered as the origin of the ferroelectricity. In this way, the $SrTiO_3$ ferroelectricity can be modulated by control the concentration of the antisitelike defects via changing the cation concentration. Further, $[(SrTiO_3)_3/(LaTiO_3)_2]_3$ superlattices have been prepared on $0.67[Pb(Mg_{1/3}Nb_{2/3})O_3]$-$0.33[PbTiO_3]$ (PMN-PT) substrate. The superlattices show resistance switching under the ferroelectric polarization of the PMN-PT substrate. The on/off ratio of the interfacial resistance is about 20%˜25%. This can be applied in oxide electronics in potential.

[1]This work is supported by Chinese MOST (Grant No. 2014CB921001), Chinese NSFC (Grant No. 11404381 Grant No. 11225422) and the Strategic Priority Research Program (B) of the Chinese Academy of Sciences (Grant No. XDB07030100).

Fang Yang
Beijing National Laboratory for Condensed Matter Physics
Institute of Physics, Chinese Academy of Sciences

Date submitted: 31 Oct 2016 Electronic form version 1.4