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Ultrathin flexible electronic device based on tunneling effect: A flexible ferroelectric tunnel junction

Pengfei Hou

Xiangtan University, China

The flexible electronics have attracted long-standing attention in today's energy-conscious world. Among the flexible ferroelectric electronics, flexible ferroelectric memory is an important device for information storage, data processing, and communication. The flexible ferroelectric tunnel junction can realize non-destructive readout and consume less energy, and it may be a very promising device owing to the advantages of excellent portability, bendability and being lightweight. However, few flexible ferroelectric tunnel junctions with good performance have been reported because the inorganic materials with good ferroelectric properties always have a high crystallization temperature which restricts the flexible substrate selection. In this report, we report a flexible ferroelectric tunnel junction which is based on $\text{PbZr}_{0.52}\text{Ti}_{0.48}\text{O}_3$ film grown on Mica with a bottom electrode of SrRuO_3 film. The flexible ferroelectric tunnel junction in asymmetric structure not only can achieve nondestructive readout, but also have good bendability. Especially, the on/off ratio of the junction relaxed is high to 32710%. Although the switching ratio decreases when the junction is bended, the ON/OFF states can still be distinguished clearly. The application of flexible ultrathin ferroelectric film is beneficial to realize the flexible ferroelectric electronic devices which are integrated with the flexible circuit system in modern microelectronics.

2008.houpengfei@163.com