Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Ferroelectric Tunnel Junctions Based on Pseudotetragonal $BiFeO_3$[1] FLAVIO Y. BRUNO, S. BOYN, V. GARCIA, S. FUSIL, H. YAMADA, C. CARRETERO, C. DERANLOT, E. JACQUET, K. BOUZEHOUANE, Unité Mixte de Physique CNRS/Thales, 91767 Palaiseau, France, S. XAVIER, Thales Research and Technology, 91767 Palaiseau, France, J. GROLLIER, M. BIBES, A. BARTHELEMY, Unité Mixte de Physique CNRS/Thales, 91767 Palaiseau, France — The concept of a ferroelectric tunnel junction (FTJ) was formulated in the early 70s by Esaki et al. It took more than 30 years to realize this idea experimentally in a reliable and reproducible manner[1]. FTJs have shown to be versatile devices and the possibility to use them as memories [2] and memristors [3] have been recently demonstrated on $BaTiO_3$ based junctions. With the aim of expanding its functionalities we have realized FTJ with multiferroic pseudotetragonal $BiFeO_3$ (T-BFO) tunnel barriers. In order to fabricate junctions we deposited fully epitaxial bilayers consisting of a $LaNiO_3$ or doped $CaMnO_3$ bottom electrodes and the T-BFO tunnel barriers. On top of this bilayers, Co/Au electrodes as small as 200 nm in diameter were defined by e-beam lithography and lift-off. We have measured ON/OFF ratios as large as 10000 on these junctions, much larger than that observed in FTJs with $BaTiO_3$ tunnel barriers. We will show that the resistance of the FTJ in its high, low and intermediate states is related with the polarization state of the barrier as observed by PFM. [1]Nature 460,81(2009). [2]Nat. Nanotech. 7, 101 (2011). [3] Nature Mat. 11, 860 (2012).

[1]We acknowledge financial support from the European Union Research Council (ERC Advanced Grant Femmes, No. 267579).

Flavio Y. Bruno
Unité Mixte de Physique CNRS/Thales, 91767 Palaiseau, France

Date submitted: 04 Dec 2012 Electronic form version 1.4