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Tailoring of ferromagnetic/ferroelectric superlattices for multiferroic properties W. PRELLIER, CNRS/ENSICAEN, P. MURUGAVEL, D. SAUREL, CH. SIMON, B. RAVEAU — Superlattices composed of ferromagnetic $Pr_{0.85}Ca_{0.15}MnO_3$ insulating layers and ferroelectric $Ba_{0.6}Sr_{0.4}TiO_3$ layers were fabricated on (100)-$SrTiO_3$ substrates by pulsed-laser deposition. The magnetotransport properties were measured with the current perpendicular to the plane geometry. An increase in magnetoresistance (MR), with no significant low field effect, was observed as the number of ferroelectric layer increases even up to 9 unit cells. This observed large MR cannot be explained by simple interfacial ferromagnetism or by the tunneling magnetoresistance. The capacitance and resistive parts of the samples were also analyzed from the complex impedance measurements, performed on the samples using a special experimental set-up. The superlattice with larger ferroelectric thickness shows unique characteristics which are not present in the parent ferromagnetic thin film and both ferromagnetic and ferroelectric transitions which is an evidence for the coexistence of both the properties. The high magnetoresistance (40% at 80K) shown by the superlattice can be attributed to the coupling between ferromagnetic and ferroelectric layers, i.e, to the magnetoelectric effect. Various examples with different materials will also be presented to confirm these results.

W. Prellier
CNRS/ENSICAEN

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