ELECTROCERAMICS XI
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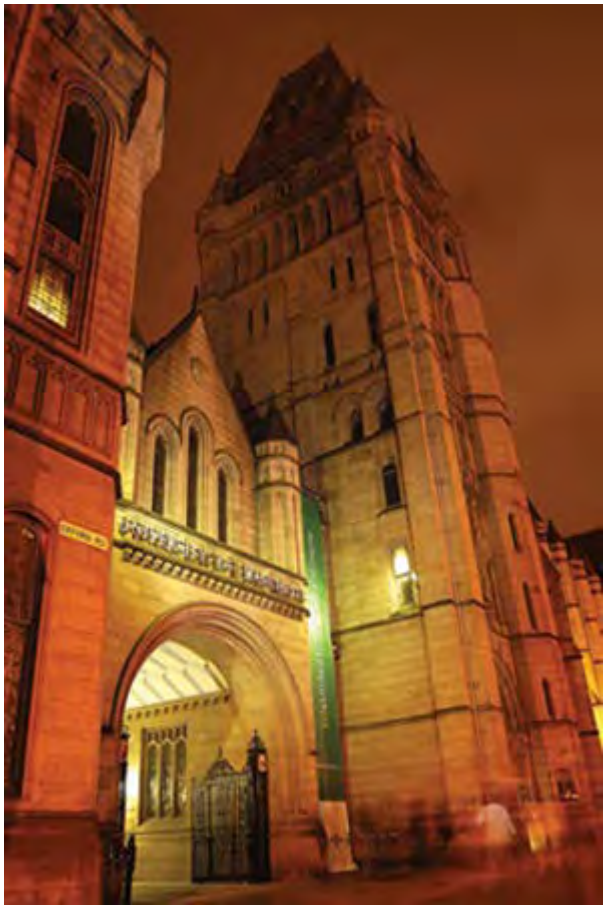

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Multiferroic materials based on $(La,Sr)MnO_3/(Ba,Y)(Ti,Sn)O_3$

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In recent years, multilayer structures based on ferromagnetic and ferroelectric compounds has become an object of interest. Their production would make it possible to develop new types of devices in which the properties of one material could be controlled by changing the properties of the other materials. The aim of this work is to synthesize $(La,Sr)MnO_3$ films applied to ferroelectric substrate and $(Ba,Y)TiO_3$- and $Ba(Ti,Sn)O_3$-based films, the properties of which can be controlled by means of an electric field, and to study their crystal and magnetoresistive properties. $(La,Sr)MnO_3$ films were fabricated by magnetron sputtering, sol-gel method and screen printing. At the first stage, they were applied to substrates of ferroelectrics-semiconductors $(Ba,Y)TiO_3$, which are characterized by the presence of PTCR effect, and to $Ba(Ti,Sn)O_3$ substrates, which have nonlinear electrophysical properties. At the second stage, $(La,Sr)MnO_3$ films were applied to ferroelectric films of $(Ba,Y)TiO_3$ and $Ba(Ti,Sn)O_3$. Polycrystalline α-Al_2O_3 as a nonconducting materials possessing no nonlinear properties was chosen as a standard substrate for $(La,Sr)MnO_3$. The synthesis condition for substrate and films were optimized using results of X-ray phase analysis and scanning electron microscopy. The unit cell parameters for all materials obtained were refined by X-ray phase full-profile (Rietveld) analysis. The electrical resistance of ferromagnetic films was measured by the four-probe method at 77 – 350K. The magnetic resistance (MR) was measured in magnetic fields of up to 1200 kA/m and calculated using the relation $MR = (R_0 - R_H)R_0 \cdot 100\%$, where R_0 is electrical resistance in a zero magnetic field, and R_H is electrical resistance in a magnetic field of intensity H. It has been found that the unit cell parameters and preferred orientation of $(Ba,Y)TiO_3$- and $Ba(Ti,Sn)O_3$-based ferroelectrics influence the crystallographic parameters of films. It has been shown that $La_{0.775}Sr_{0.225}MnO_3$ films applied to the ferroelectric $(Ba,Y)TiO_3$ and $Ba(Ti,Sn)O_3$ are polycrystalline and have a partial preferred orientation (in the [001] or [110] direction), which leads to a change in their magnetoresistive properties. The investigation carried out showed the magnetic resistance and temperature dependence of the resistance of $La_{0.775}Sr_{0.225}MnO_3$ films to be highly sensitive to the electric field applied to ferroelectrics materials.