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Substrate effect on low-field transport properties of La–Pb–Mn–O granular-type thin films

Hi Min Lee, In-Bo Shim, and **Chul Sung Kim**[*]

Department of Physics, Kookmin University, Seoul 136-702, Korea

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This paper studied the low-field tunnel-type transport characteristics of polycrystalline and *c*-axis-oriented $La_{0.7}Pb_{0.3}MnO_3$ (LPMO) thin films. Polycrystalline thin films were fabricated on SiO_2/Si(100) substrate (film A), on SiO_2/Si substrate with yttria-stabilized zirconia (YSZ) buffer layer (film B), and on *c*-axis-oriented thin film grown on $LaAlO_3$(001) (LAO) single crystal substrate (film C) using the soft-chemical deposition method. A YSZ buffer layer acts as a barrier against inter-diffusion. As a result, it decreases the amount of dead layers generated from the interface and helps to produce qualitative films for application of magnetoresistive elements. The magnetoresistance (MR) ratio was 0.52%, 0.7%, and 0.4% for film A, film B, and film C under the applied field of 500 Oe at 300 K, respectively. The polycrystalline film had denser boundaries than the *c*-axis oriented film, i.e., the polycrystalline film gave more effective potential barrier regions than the *c*-axis oriented film.