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ABSTRACTS

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Low-field Transport Properties of La-Pb-Mn-O Thin Films

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The low-field transport properties of polycrystalline and c-axis-oriented La0.7Pb0.3MnO3 (LPMO) thin films were characterized. The LPMO films were synthesized using soft-chemical deposition method. Polycrystalline thin films were fabricated on SiO2 /Si(100) substrate and SiO2 /Si substrate with yttria-stabilized zirconia (YSZ) buffer layer, while c-axis-oriented thin film was grown on LaAlO3 (001)(LAO) single crystal substrate. YSZ buffer layer acts as a barrier against inter-diffusion. As a result, it decreases the amount of dead layer generated from interface and helps produce quality films with magnetoresistance. The full width at half maximum (FWHM) of the rocking curve scan of LPMO/LAO film was 0.33 o. The MR ratio was 0.52 % and as high as 0.7 % in LPMO/SiO2/Si film and the film with YSZ buffer layer, respectively. On the other hand, the MR ratio of the LPMO/LAO film was less than 0.4 % under the applied field of 500 Oe at 300 K. MR peaks of low field magnetoresistance hysteresis were observed near the coercive field. The microstructures and the surface morphologies of the films were examined by scanning electron microscopy(SEM) and atomic force microscopy (AFM). The grain size of the polycrystalline film(310 Å) is much smaller than that of the LPMO/LAO film(580 Å) which has a coherent grain structure. The polycrystalline film had more boundaries than the c-axis oriented film, i.e., the polycrystalline film gave more effective potential barrier regions than the c-axis oriented film. The difference of the low-field MR values was due to the grain boundary characteristics.