

Microstructure and magnetic properties of PrMnO₃ bulk and thin film

ABSTRACT

Perovskite PrMnO₃ (PMO) had been prepared in bulk by solid state reaction and thin films on corning glass, fused silica and MgO (100) glass substrate by pulsed laser deposition technique. SEM micrographs show that grains with size 2~3 μm is observed in bulk PMO while thin films PMO show strongly connected grain structure with particle size that not larger than 100 nm. X-ray diffraction analysis shows that all samples are in single phase with orthorhombic crystal structure. Bulk PMO sample had lattice strain of 0.134% which is the lowest value among others. However, larger lattice strain was observed in thin film samples due to lattice mismatch between film-substrate and caused the MnO₆ to deform. All samples shown paramagnetic or antiferromagnetic behavior, enhancement in magnetization value occurred for all PMO grew as film. We believe that larger lattice strain favor the grain growth of PMO towards more order phase. In summary, formation of structure and microstructure of thin film PMO depends on type of substrate used and it affect the magnetic property.

Keyword: Magnetic properties; Manganites and antiferromagnetics; Thin films; X-ray diffraction