

Struktur Magnetik pada CaMnO₃ dan LaMnO₃ dengan Difraksi Neutron

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Abstrak

Information about magnetic structure can not be obtained through X ray diffraction method. Therefore data from neutron diffraction are needed to find out substance magnetic structure. From that structure, we can get information about magnetic crystal structure and magnetic momentum or the structure of the spin. The research is aimed to find out magnetic structure at CaMnO₃ dan LaMnO₃ in powder. The preparation of CaMnO₃ and LaMnO₃ substance is made through powder method and stoikiometric calculation. Basic substance of CaMnO₃ is CaCO₃ and MnO₂, while basic substance of LaMnO₃ is La₂O₃ and MnO₂. After the substances are mixed, time varied milling, temperature varied sintering and annealing are conducted. It is hoped that the substances will be united or form a new phase.

The magnetic structure study of CaMnO₃ and LaMnO₃ at this research are explained by neutron powder diffraction. CaMnO₃ is good analisis at crystal system on orthorhombic space group Pnma with lattice parameter at 12 k is $a = 5.2692 \text{ \AA}$, $b = 7.4403 \text{ \AA}$, $c = 5.2596 \text{ \AA}$. LaMnO₃ is good analisis at crystal system on monoklinik space group P1121/a with lattice parameter at 12 K is $a = 5.4726 \text{ \AA}$, $b = 7.7613 \text{ \AA}$, $c = 5.5324 \text{ \AA}$. Magnetic parameter Mn atomic has charge ordered of CaMnO₃ and LaMnO₃ is Mn⁴⁺ ion and Mn³⁺ ion.

Result at research with High Resolution Powder Diffractometer, HRPD to find, CaMnO₃ has properties magnetic at Mn atomic with indeks miller hkl (011) angle $2\theta = 24.486$ on 12 K. LaMnO₃ has properties magnetic at Mn atomic with indeks miller hkl (200) and angle $2\theta = 38.966^\circ$. Magnetic structure Mn atomic at $4b(0,0, 2 1)$ simetri of CaMnO₃ is four possible nonkolinear ferromagnetic, with value magnetic momen is $m(\text{Mn}) = 1.73 \text{ B } \mu$. Magnetic structure Mn atomic of LaMnO₃ at $2c(0,0, 2 1)$ is two possible (antiferromagnetik and ferromagnetic) and $2d(2 1, 2 1, 0)$ simetri is two possible antiferromagnetic, with value magnetic momen is $m(\text{Mn}) = 2.23 \text{ B } \mu$.