

INFORMATION ON MASTER'THESIS

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2. Sex: female
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5. Admission decision number: Dated: .../.../2009
6. Changes in academic process:
7. Official thesis title: *“The change in properties of La - deficient $La_{0,60}Ca_{0,30}MnO_3$ compound”*
8. Major: Thermal Physics
9. Code: 60 44 09
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11. Summary of the finding of the thesis: In this article, we obtain:

In recent years, the scientists focus on researching substance in magnetic refrigeration, such as $La_{1-x}Ca_xMnO_3$ compound. The particularly attractive in it is La-deficient compound, which has phase transport temperature at the room temperature and significant magnetocaloric effect... $La_{0,60}Ca_{0,30}MnO_3$ compound is one of the special compound that we research, and it also being compared with $La_{0,70}Ca_{0,30}MnO_3$ and $La_{0,60}Ca_{0,40}MnO_3$ compound.

The research samples was prepared by the solid state-reaction method.

La_2O_3 , MnO and $CaCO_3$ with the purity (3N - 4N) are mixed, crushed in 2 – 4 hours, dried at 200°C in 1 – 2 hours, crushed in 2 – 4 hours and compressed into small balls. These balls were heating at 1000°C in 4 - 8 hours, then cools them to room temperature. Recrushed and compressed into small balls the initial size... Kept at 650°C in 15 hours. Ending the system by turn off and have the sample with room temperature.

The XPD pattern reveal that the research samples are single phase orthorhombic - perovskite structures. Lattice parameters of the $La_{0,60}Ca_{0,30}MnO_3$ sample have been determined, which are $a = 5,455$; $b = 5,467$ and $c = 7,726$ which is identified with the Pnma structure in comparison with the crystal structure of the parent compound $LaMnO_3$. So it is found that the crystal structure of $La_{0,60}Ca_{0,30}MnO_3$ sample has been distorted by the La deficiency.

By Dicromat method, we determined the oxygen concentration in $\text{La}_{0,60}\text{Ca}_{0,30}\text{MnO}_3$. With $\delta = 0,0184$. From the oxygen deficiency, the ratio of $\text{Mn}^{3+} : \text{Mn}^{4+}$ was estimated to be 0,776. The ratio is smaller than $\text{La}_{0,70}\text{Ca}_{0,30}\text{MnO}_3$ and $\text{La}_{0,60}\text{Ca}_{0,40}\text{MnO}_3$ samples. It's suggested that dominate interactions in La - deficient $\text{La}_{0,60}\text{Ca}_{0,30}\text{MnO}_3$ sample moves from DE to SE.

The temperature dependence of the magnetization measured under zero - field (ZFC) and field cooled (FC) conditions. The Curie temperature T_C is determined as 300 K to La - deficient $\text{La}_{0,60}\text{Ca}_{0,30}\text{MnO}_3$ sample, that is higher than the Curie temperature T_C of $\text{La}_{0,70}\text{Ca}_{0,30}\text{MnO}_3$ sample ($T_C = 285$ K) and $\text{La}_{0,70}\text{Ca}_{0,30}\text{MnO}_3$ sample ($T_C = 275$ K).

The resistivity curve of the samples identified, La - deficient sample has metal - semiconductor phase transition at $T_P = 272$ K. That phase transition also appears in La - sufficient compounds ($\text{La}_{0,70}\text{Ca}_{0,30}\text{MnO}_3$ has $T_P = 227$ K and $\text{La}_{0,60}\text{Ca}_{0,40}\text{MnO}_3$ has $T_P = 269$ K).

The obtained magnetic - entropy change ΔS_{mag} as a function of temperature. The maximum magnetic - entropy change of $\text{La}_{0,60}\text{Ca}_{0,30}\text{MnO}_3$ is reached at its Curie temperature, where the change of magnetization with temperature is the fastest. The maximum magnetic - entropy change, corresponding to a magnetic - field change of 1, 3 and 5 T, is 2.05, 4.42 and 5.58 J/kgK.

12. Practical applicability: Applied in magnetic refrigeration substance at the room temperature or higher.

13. Further research directions: Researching a La - deficient sample system to find out the rules in their changing properties.

14. Thesis-related publications: *Electronic and magnetic properties of $\text{La}_{2/3}\text{Pb}_{1/3}\text{Mn}_{1-x}\text{Co}_x\text{O}_3$ compounds*, VNU. Journal of Science, Mathematics - Physics, (2008).

Date:05/05/2012

Signature

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