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## Relationship between the Thermal Expansion and Spontaneous Magnetization in $\text{LaFe}_{13-x}\text{Al}_x$ ( $1.2 \leq x \leq 1.8$ ) Rare Earth Intermetallic Compounds

*Tuesday, June 30, 2015 2:00 PM (2 hours)*

The Fe-based  $\text{NaZn}_{13}$ -type compounds  $\text{LaFe}_{13-x}\text{M}_x$  ( $\text{M}=\text{Si}, \text{Al}$ ) have attracted considerable attention because of their intriguing properties, such as magnetocaloric effect and abnormal thermal expansion. These unusual properties are of fundamental interest and have potential technical applications in cryogenic engineering when related materials operate in low temperature environment. The thermal expansion coefficient and spontaneous magnetization of rare earth intermetallic compounds  $\text{LaFe}_{13-x}\text{Al}_x$  ( $1.2 \leq x \leq 1.8$ ) have been investigated and relationships between them were considered. Results indicate that  $\text{LaFe}_{11.6}\text{Al}_{1.4}$  and  $\text{LaFe}_{11.4}\text{Al}_{1.6}$  show near zero thermal expansion behavior from room temperature to liquid helium temperature. And it has been found that the spontaneous magnetostriction is proportional to the square of the spontaneous magnetization, which proves that the thermal expansion has a close relation with the spontaneous magnetization.

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