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论文

磁制冷材料Gd_5Ge_4中的磁玻璃态

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摘要：

Gd_5Ge_4低温时具有玻璃态的不稳定性,与钴氧化物$La_{0.88}Sr_{0.12}CoO_3$的冻结的自旋玻璃态不同. 通过分别研究经过零场冷过程后Gd_5Ge_4和$La_{0.88}Sr_{0.12}CoO_3$在低温区域的温度循环对磁化强度的影响,发现在Gd_5Ge_4样品中磁化强度随着温度循环的增加而不断增大,但是在$La_{0.88}Sr_{0.12}CoO_3$样品中温度循环对其磁化强度几乎没有影响.Gd_5Ge_4和$La_{0.88}Sr_{0.12}CoO_3$的直流磁化强度和交流磁化率也进行了测量.Gd_5Ge_4的交流磁化率的峰并不随着频率的增加而向高温区移动,这个现象不同于$La_{0.88}Sr_{0.12}CoO_3$样品的. 通过不同物理参数的测量,证明了Gd_5Ge_4的这种磁玻璃态不同于传统的自旋玻璃态.

关键词： 磁玻璃态；自旋玻璃；磁热材料

The magnetic glass state in the magnetocaloric material Gd5Ge4

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Abstract:

The metastable property of glasslike dynamics at low temperature of Gd_5Ge_4 was presented in contrast to the stable frozen spin glass state in cobaltite $La_{0.88}Sr_{0.12}CoO_3$(LSCO). Through investigating the effect of temperature cycle on magnetization at the low temperature region after the zero field cooled procedure of$Gd_5Ge_4$and$La_{0.88}Sr_{0.12}CoO_3$respectively, it was found that the magnetization continues to increase with increasing the temperature cycle in Gd_5Ge_4, while there was hardly any effect on magnetization in$La_{0.88}Sr_{0.12}CoO_3$. The dc magnetization and ac susceptibility were also measured on Gd_5Ge_4 and $La_{0.88}Sr_{0.12}CoO_3$. The peaks of ac susceptibility in Gd_5Ge_4 did not move to the higher temperature region with increasing frequency, which were different from the phenomena of $La_{0.88}Sr_{0.12}CoO_3$. This kind of magnetic glass state in Gd_5Ge_4 is quite different from conventional spin glass.

Keywords: magnetic glass sate; spin glass; magnetocaloric material

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