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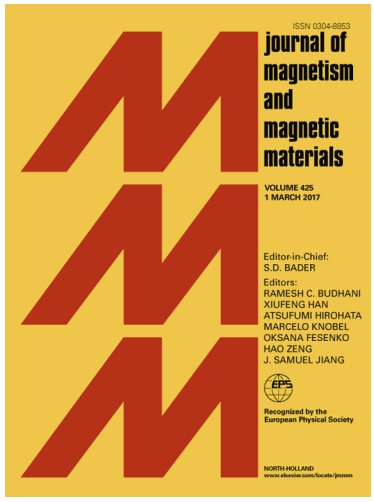

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Composite $(La_{0.45}Nd_{0.25})Sr_{0.3}MnO_3$/5CuO materials for magnetic refrigeration applications

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Abstract

In this work, the magnetocaloric properties of $(La_{0.45}Nd_{0.25})Sr_{0.3}MnO_3$ (LNSMO)-based composites are studied. The structural, microstructural, magnetic and magnetocaloric properties of LNSMO and LNSMO/5CuO samples were investigated aiming to particularly clarify the secondary phase (CuO) role in driving the magnetocaloric behavior. The main phase LNSMO crystallizes in a rhombohedral R-3C (167) configuration. The XRD patterns of composite samples show both perovskite LNSMO and monoclinic Tenorite CuO structures. The microstructural analysis unveils that the CuO phase is mainly present in the grain boundaries and segregates region. On the other hand, it was found that the magnetocaloric effect could be significantly enhanced by adding a small amount of CuO (5% weight ratio). For a magnetic field changing from 0 to 1.5 T, the corresponding isothermal entropy change was found to be 2.55 J/kg K for the LNSMO/5CuO composite while it is only about 1.1 J/kg K for the mother material LNSMO. Our finding should inspire and open new ways for the enhancement of the magnetocaloric effect in manganites-based materials.

Keywords: magnetocaloric properties, composite materials, manganites, magnetic refrigeration

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