Fabrications and Characteristics of Low-noise La-Ca-Sr-Mn-O Thin-film Thermometers

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ABSTRACT

La0.75Ca0.15Sr0.1MnO3 (LCSMO) thin films were grown on NdGaO3(110) substrates by using RF magnetron sputtering. Here the samples were deposited at different growth temperatures to probe the effect of growth temperature on this film properties. We used the standard 4-probe measurement to obtain the resistance-temperature curves. The crystalline structure and the strains in films were charactered by the X-ray diffractometer. The optimum performance is found in LCSMO grown at 610 ℃ with low strain, which show a temperature coefficient of resistance (TCR) ~ 4.9 %K-1 at 301 K and a noise equivalent temperature (NET) of 8 ×10-7 KHz-0.5 at 300 K with f = 30 Hz and I = 0.3 mA. This obtained NET value is much lower than those of other uncooled thermometers such as semiconducting YBa2Cu3O6, or vanadium oxides. We demonstrate that the LCSMO films have real potential for the application on uncooled bolometric devices.

Keywords : infrared detector、temperature coefficient of restistance、colossal magnetoresistance material

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