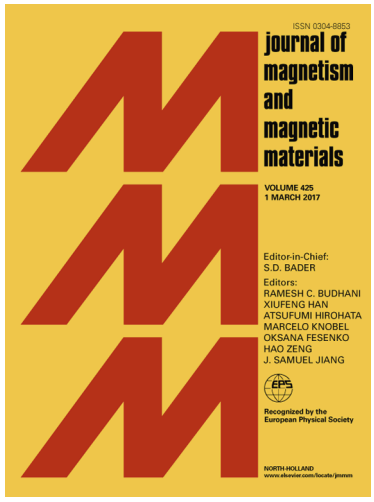

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Multiphase $Ho_{36}Co_{48}Al_{16}$ alloy featuring table-like magnetocaloric effect

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Abstract

Table-like magnetocaloric effect is an important requirement for obtaining high efficiency performance in magnetic refrigeration that uses Ericsson cycle. Magnetic and magnetocaloric properties of $Ho_{36}Co_{48}Al_{16}$ alloy, carefully selected from multiphase region of the ternary Ho-Co-Al system, have been studied. The multiphasic alloy exhibits three magnetic phase transitions spread over a wide temperature range. Suitable distribution of phase proportions and respective magnetic entropy changes result in the broadening of the overall peak magnetic entropy change of the alloy. Table-like magnetocaloric effect is obtained with magnetic entropy change of 8.5 J/kg K and large refrigerant capacity of 525 J/kg under applied magnetic field change of 0 to 5 T. At field change of 0 to 2 T, the magnitude of the magnetic entropy change plateau is 2.9 J/kg K with refrigerant capacity of 180 J/kg. The table-like feature and the competitive refrigerant capacity and applied magnetic field change values make the multiphase alloy a practical magnetic refrigerant for efficient low temperature cooling applications that employ the Ericsson cycle, even under permanent magnets.

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