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Large magnetocaloric effect in RE₂NiSi₃ with RE = Dy and Tm

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The intermetallic ternary compounds Dy₂NiSi₃ and Tm₂NiSi₃ crystallize in the AlB₂ type of hexagonal structure with the space group P6/mmm. The magnetic properties were studied by measuring magnetization as a function of temperature ($\chi(T)$), magnetic field ($M(H)$) and heat capacity ($C_p(T)$) in magnetic fields up to 7 T. Temperature dependent magnetization and heat capacity results revealed that Dy₂NiSi₃ shows an antiferromagnetic ordering with Néel temperature at around 5.9 K while Tm₂NiSi₃ does not show any transition above 2 K. The magnetocaloric effect (MCE) of the two compounds have been evaluated from isothermal magnetization ($M(T,H)$). Maximum values of isothermal magnetic entropy change ($-\Delta S_M$) and adiabatic temperature change are found to be 20.9 J/kg-K and 11.4 K respectively for Dy₂NiSi₃ and 21.7 J/kg-K and 13.4 K for Tm₂NiSi₃ for a field change up to 7 T.

Apply to be considered for a student award (Yes / No)?

yes

Level for award (Hons, MSc, PhD, N/A)?

PhD

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