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Observation of weak ferromagnetism and the sizable magnetocaloric effect in $\text{Co}_2\text{V}_2\text{O}_7$.

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Abstract

The magnetic behaviour of cobalt pyrovanadate compound $\text{Co}_2\text{V}_2\text{O}_7$ with dichromate structure is reported. The compound undergoes long range magnetic ordering below $T_C = 8$ K and our study identifies the ground state to be a canted antiferromagnetic type with a weak ferromagnetic component. The transition at T_C is found to be first-order in nature as evident from the presence of distinct thermal hysteresis in the temperature dependent magnetization data. Below T_C , a significantly large value of magnetic relaxation is observed which is possibly due to the metastability associated with the first order phase transition. Interestingly, the sample exhibits a sizable magneto-caloric effect around T_C ($\sim 4.1 \text{ J.kg}^{-1}.\text{K}^{-1}$ for 50 kOe of field change) which is reasonably high among antiferromagnetic transition metal oxides with weak ferromagnetism.

Key words: Pyrovanadate, Weak ferromagnetism, Magnetocaloric effect

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