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Magnetocaloric effect and refrigerant capacity in $\text{Eu}_8\text{Ga}_{16}\text{Ge}_{30}$ clathrates and $\text{Eu}_8\text{Ga}_{16}\text{Ge}_{30}$ - EuO composites H. SRIKANTH, A. CHATURVEDI, M.H. PHAN, S. STEFANOSKI, G.S. NOLAS, University of South Florida, V. FRANCO, University of Sevilla — $\text{Eu}_8\text{Ga}_{16}\text{Ge}_{30}$ clathrates are widely known for their excellent thermoelectric properties. Recently, we have discovered the giant magnetocaloric effect (MCE) in $\text{Eu}_8\text{Ga}_{16}\text{Ge}_{30}$ type-VIII clathrates. The tunable MCE and refrigerant capacity (RC) have also been achieved in $\text{Eu}_8\text{Ga}_{16}\text{Ge}_{30}$ type-I clathrates by partial substitution of Eu with non-magnetic Sr. As an interesting host matrix the type-I clathrates are combined with EuO at different portions (80%/20%, 70%/30%, 65%/35%, 60%/40%, 40%/60%) for making novel composites with enhanced RC over a tunable temperature range (10-100K). We have achieved a very large RC of 794 J/kg at 5T over a 70K in the clathrate type I – EuO (40%/60%) composite, which is the largest value ever achieved among the existing materials for magnetic refrigeration around 70K. This composite is very attractive for magnetic refrigeration for nitrogen liquefaction. A new potential of using the type VIII clathrate – EuO composite (50%-50%) to produce refrigeration in two different temperature ranges has been proposed.

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