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The cryogenics magnetocaloric effect in the blocking state superparamagntic nanocapsules[1] SONG MA, XIANGUO LIU, TENG YANG, ZHIDONG ZHANG, Institute of Metal Research, Chinese Academy of Sciences — The large cryogenics magnetocaloric effect was obtained in superparamagnetic nanocaspules when they are in blocking state. Interestingly, the entropy change of superparamagnetic nanocapsules (Lanthannide-transition metal intermetallic compound), including $GdAl_2/Al_2O_3$, $TbAl_2/Al_2O_3$, $DyAl_2/Al_2O_3$ nanocapsules, shows an unusual sharp increase, when the nanocaspules go into their blocking state. Combining the structural and magnetic analysis, we find the high moment density and low anisotropy energy play crucial role in exciting and hindering the rotation of the moment process, which finally decide the magnitude of the entropy change. The entropy change dependence of the temperature change and applied magnetic field was obtained according to the langevin theory.

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