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Low-temperature spin dynamics of Mn-rich Mn(Ga)As nanoclusters embedded in a GaAs matrix WEIZHU WANG, JIAJUN DENG, JUN LU, BAOQUAN SUN, JIANHUA ZHAO, State Key Laboratory for Superlattices and Microstructures, Institute of Semiconductors, Chinese Academy of Sciences — Recently, the composite systems of Mn-rich Mn(Ga)As nanoclusters embedded in GaAs matrices have received an increasing attention due to the large magneto-optical and magneto-resistance effects at room temperature which could be applied to spin-electronic devices. In this work, we report the low-temperature spin dynamic behaviours including memory effects and slow magnetic relaxation of such composite systems. The systems can be formed by *in situ* postgrowth annealing of (Ga,Mn)As films at 650 °C for 10 min because of spinodal decomposition. High-resolution TEM images show zincblende Mn-rich Mn(Ga)As nanoclusters with a diameter in the range of 10-20 nm embedded in a GaAs matrix. From zero-field cooled and field cooled measurements, we can observe a clear bifurcation of the two curves demonstrating the existence of the spin-glass-like phase below the blocking temperature in the systems with high Mn concentration. Memory effects and slow magnetic relaxation, the typical characteristics of spin-glass-like phases, are also detected, and the hierarchical model is confirmed to be in accordance with such low-temperature behaviours. On the other hand, for samples with low Mn content, ferromagnetic order remains up to 360K.

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