

Be codoped GaMnAs 의 전자기적 특성
ELECTRIC AND MAGNETIC PROPERTY OF Be CODOPED GaMnAs

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It is well known, that ferromagnetic GaMnAs has Curie temperature (T_c) less than 110 K. One of the ways to improving T_c is the rising of hole concentration in semiconductor. Be as an acceptor can effectively increase hole concentration in GaMnAs, so it might be expected to increase of T_c in GaMnAs with Be codoping. So the investigation of the effect of Be codoping on the electric and magnetic property of GaMnAs becomes necessary. We have grown a series of GaMnAs:Be samples with varied Mn flux from 850°C to 910°C at a fixed Be flux ($T_{Be}=1250^\circ\text{C}$) via MBE. Mn concentration varied from 0.2% to 1.15%. It is shown that most of Mn in all samples even in the sample with the lowest Mn concentration 0.2% exists as MnAs cluster. During the growth process, Be atoms compete with Mn atoms for the sites of Ga on the substrate, and which results in the deviation of Mn atoms out of Ga sites, what promote the formation of MnAs cluster. Because of Be codoping, the conductivity of the samples was increased dramatically compared with GaMnAs without Be codoping. The data confirmed that Be is a more effective acceptor than Mn itself. Anomalous Hall effect has been observed in GaMnAs:Be samples at room temperature, so that the magnetization with Curie temperature higher than room temperature has been realized. It is established that this increasing of T_c due to MnAs. A hysteresis loop has also been drawn at room temperature with coercivity about 100 Oe. With planer Hall effect measurement a MR value was obtained at room temperature.

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