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Magnetotransport and magneto-optical properties of GaMnAs thin films with high Mn concentrations KENICHI OHNO, Dept. of Electronic Eng., The Univ. of Tokyo, SHINOBU OHYA, Dept. of Electronic Eng., The Univ. of Tokyo; PRESTO JST, MASAAKI TANAKA, Dept. of Electronic Eng., The Univ. of Tokyo; SORST JST — III-V-based ferromagnetic-semiconductor (FMS) GaMnAs is a good model system for future semiconductor-spintronics devices. For practical applications, it is important to increase the Curie temperature (T_C) of GaMnAs (the current record is 173 K) to room temperature. The mean field theory predicts that T_C of GaMnAs increases in proportion to its Mn concentration x. However, it is difficult to grow GaMnAs with $x > 10\%$, because MnAs clusters and Mn interstitial defects are easily formed in such a high x region. Here, we have successfully grown GaMnAs films with x of 12 - 21% by decreasing the growth temperature to 150-200^{o}C and by reducing the film thickness to 10 nm. The magnetic circular dichroism and the anomalous Hall effect measurements indicated that these GaMnAs films have the intrinsic FMS features. A high T_C value of 170 K was obtained when $x = 12\%$. This work was partly supported by PRESTO/SORST of JST, Grant-in-aid for Scientific Research, IT Program of RR2002 of MEXT.

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