

Magnetoplasma Excitation in Double CdTe/CdMgTe Quantum Wells

D. Yavorskiy^{1,4}, M. Szola¹, K. Karpierz¹, I. Własny¹, D. Śnieżek², P. Nowicki², J. Wróbel², S. Chusnutdinow², G. Karczewski², T. Wojtowicz³, and J. Łusakowski¹

¹*Faculty of Physics, University of Warsaw, ul. L. Pasteura 5, 02-093 Warsaw, Poland*

²*Institute of Physics, PAS, al. Lotników 32/46, 02-668 Warsaw, Poland*

³*International Research Centre – MagTop, Institute of Physics, PAS, al. Lotników 32/46, 02-668 Warsaw, Poland*

⁴*Center for Terahertz Research and Applications, Institute of High Pressure Physics PAS, 01-142, Warsaw, Poland*

Cadmium telluride heterostructures with a two-dimensional electron gas (2DEG) have been studied in magnetotransmission. The main reason that motivated this research was an interest in basic studies of low-energy excitations of a 2DEG. In general this direction of research is related to the cyclotron resonance and magnetoplasma excitations observed at low temperatures and high magnetic fields. Up to this moment, most of such research has been concentrated on GaAs/AlGaAs systems and much less data exists for CdTe-based devices. Recently, we have presented results of THz magnetospectroscopy studies on single modulation doped CdTe/CdMgTe quantum wells [1].

In this work we concentrate on modulation doped double CdTe/CdMgTe quantum wells. The idea of the present research was to compare THz excitations in three types of samples: A - as grown, B - with a gold grid and C - with the surface etched in such a way that a grid was formed with trenches cutting one quantum well only. The period of grids for samples B and C and their aspect ratio was equal to 8 μm and 50%, respectively. Magnetotransmission of THz radiation through the samples was measured at 2 K. The source of THz radiation was a molecular laser. To register a transmitted signal we have used a carbon bolometer.

In both samples A and B we have observed a cyclotron resonance only with an effective mass equal to $0.101m_0$ and no evidence of magnetoplasma excitation was found in sample B. However, in sample C we have observed only magnetoplasmon excitations with a high amplitude, comparable to the cyclotron resonance in sample A.

To summarise, we propose that samples with double quantum wells with etched grid are good adapted for observation of magnetoplasmon excitations.

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