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Magneto-infrared study on 2-dimensional electrons and holes in GaSb-InAs-AlSb coupled quantum wells. LI-CHUN TUNG, NHMFL, P.A. FOLKES, Army Research Laboratory, WEN XU, Australian National University, YONG-JIE WANG, NHMFL — InAs-AlSb heterostructures have been a subject of interests for their unusual type-II band alignment between InAs and AlSb. The spatially separated 2-dimensional electron and hole gases are confined in different layers and in equilibrium with each other at the InAs/GaSb interface. This unique circumstance has led to several predicted many-body effects, as well as possible applications as infrared detectors and sources. In the past, magneto-infrared studies on InAs-AlSb single quantum wells have revealed a range of phenomena arising from the electron-hole binding. We have carried out an infrared optical study up to 33T on a series of GaSb-InAs-AlSb coupled quantum well structures, in which the electrons and holes are separated by a thin barrier and the Fermi level is tuned by the thickness of the GaSb cap layer. In addition to the electron cyclotron resonance (CR), another transition has been observed at the fields higher than 13 T. The linewidth of the CR shows the oscillatory behavior with the filling factor that is consistent with the electron densities obtained from the transport measurements. The transition energy of this line is close to the energy difference between the lowest Landau level (LL) in the InAs layer and the highest LL in the GaSb layer, which suggests that the it might result from an excitonic transition across the barrier.

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