

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Mid-infrared transmission and reflection measurements of degenerately doped quantum wells¹ A. J. HOFFMAN, L. ALEKSEYEV, E. E. NARIMANOV, C. GMACHL, Princeton University, D. L. SIVCO, Lucent Technologies — Degenerately doped quantum wells are proposed as a non-magnetic left-handed material in the mid-infrared wavelength range. Such anomalous wave propagation is predicted for waveguides with highly anisotropic dielectric constants. [V. A. Podolskiy, et al. Phys.Rev. B **71**, 201101 (2005)] Three samples consisting of 85 Å AlGaAs/InGaAs quantum wells and barriers were prepared. Doping densities of $1.7 \times 10^{19} \text{ cm}^{-3}$ and $1.1 \times 10^{19} \text{ cm}^{-3}$ were used for the degenerately doped samples and compared to a control sample doped $2 \times 10^{17} \text{ cm}^{-3}$. Reflectance and transmittance as a function of incident angle, wavelength, and polarization were measured. Strong resonances were observed at 10.9 μm and 13.2 μm , respectively, for the two highly doped samples over a wide range of experimental incident angles ($35^\circ - 75^\circ$) for the relative reflectance of transverse magnetic to transverse electric polarization. No such resonances were observed for the low-doped sample or a highly doped bulk InGaAs sample.

¹This work is partly supported by PRISM, Princeton University.

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Date submitted: 30 Nov 2005

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