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Study of the 2DEG in InGaAs/AlInAs heterostructures by persistent photoconductivity effect YU-CHI HSU, C.H. HSIEH, M.H. GAU, Y.L. CHEN, W.T. CHIU, C.C. YANG, J.Y. SU, IKAI LO, Department of Physics, Center for Nanoscience and Nanotechnology, National Sun Yat-Sen University, Kaohsiung, Taiwan, Republic of China, J.K. TSAI, Center for general education, National Formosa University, Yunlin, Taiwan, Republic of China, F.S. CHAO, Department of computer Science and Electrical Engineering, Univ. of Maryland, Baltimore, MD20742, USA — The electronic properties of the two-dimensional electron gas (2DEG) in InGaAs/AlInAs heterostructures have been studied by Shubnikov-de Haas measurement at 0.3 K. After illuminating at 0.3 K, the carrier density of the sample increased from $2.310^{12} \text{ cm}^{-2}$ to $2.5 \times 10^{12} \text{ cm}^{-2}$ and the mobility decreased slightly from $36200 \text{ cm}^2/\text{Vs}$ to $34900 \text{ cm}^2/\text{Vs}$. In order to study the effect of the channel width on the 2DEG, we made the nanometer-scaled 2DEG channels were varied with different widths of 100 nm to 500 nm. The SdH measurement was performed on these wires for the magnetic field up to 12 T at 0.3 K. We observed the persistent photoconductivity effect on these wires and the electronic properties of these wires are under investigation.

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