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Effect of surface and interface states on the piezoresistivity of 2D electrons in III/V heterojunctions MIWA HOKII, MASATO OHMORI, HIROYUKI SAKAKI, Toyota Technological Institute — Uniaxial strains applied along the interface of n-AlGaAs/GaAs heterojunctions induce piezoelectric fields normal to the interface and change both the density N_s of 2D electrons and the resistance R of the channel. We have measured this piezoresistance in a group of samples grown on (111)B, where the inversion symmetry is absent. Resistance changes$\Delta R/R$ of typically 1% were observed for the external strain of 5×10^{-4}, indicating that the electron density N_s changed by about $10^9/cm^2$. It should be noted that the change of N_s is affected not only by changes in the polarization charges at the surfaces and interfaces, resulting from the piezoelectric field, but also by changes in localized charges on the surface and interface states. Indeed, our measurements have shown that the magnitude of piezoresistance depends sensitively on whether the sample surface is kept bare or clad by SiO_2 and/or metal film. By analyzing these data, we have shown that the density of surface states can be quantitatively evaluated. This method is extended also to study n-AlGaAs/GaAs samples formed on (100) surface, in which external strains break the inversion symmetry.

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