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# Observation of the Persistent Photoconductivity Due to the DX Center in GaAs under Hydrostatic Pressure

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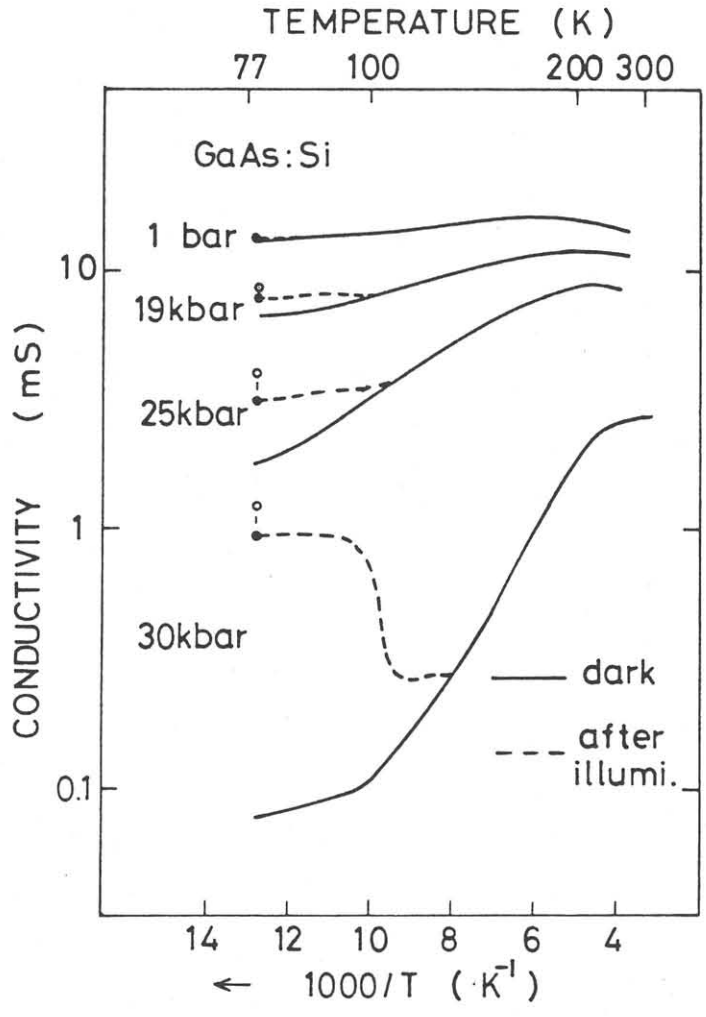
Recently, we have shown that the DX center, which had long been believed characteristic of an AlGaAs alloy system, manifests itself also in GaAs under hydrostatic pressure on the basis of the DLTS experiments.[1] In this paper, we demonstrate for the first time that the GaAs under a hydrostatic pressure of about 30 kbar shows the persistent photoconductivity. This indicates that the DX center observed in GaAs under pressure and that in alloy system behave quite similarly showing large lattice relaxation.

The samples investigated are n-type GaAs:Si ($n=2\times10^{17}$ $cm^{-3}$, $\mu=4{,}000$ $cm^2/V\cdot sec$) grown by MBE on the semi-insulating GaAs substrate. Ohmic contacts were made by evaporating Au-Ge on the epitaxial layer followed by alloying. A GaAs LED was used as an excitation source. The sample and the LED were mounted in a piston-cylinder type cell with a pressure medium of kerosine and transformer oil for the application of hydrostatic pressures up to 30 kbar. It is noted that the band gap energies of the sample and the LED can be changed simultaneously by pressure, assuring the band-to-band and the DX center excitation of the sample.

The characteristic persistent photoconductivity is clearly seen in the figure, when the sample is under 30 kbar. In view of the fact that the DX center signal starts to appear in DLTS spectra at about 25 kbar for this sample, we believe that the observed persistent photoconductivity is due to the DX center which emerged owing to the change in the conduction band structure from GaAs-like to AlGaAs-like by the hydrostatic pressure.

1) M. Mizuta, M. Tachikawa, H. kukimoto and S. Minomura: Jpn. J. Appl. Phys. 24 (1985) L143.




Temperature dependence of dark conductivity (solid lines) and photoconductivity (dotted lines) under various hydrostatic pressures. Open cercles are photoconductivity under photoexcitation, and filled circles are photoconductivity after the light is blocked. The photoconductivity at 77K after the light is blocked under 30 kbar persists for longer than 1 hour.