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Near Bandedge Optical Absorption Processes in Semi Insulating and N-Type GaAs

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Abstract: Near bandedge optical absorption processes in semi-insulating (SI) GaAs and Te-doped n-type GaAs crystals were investigated in the temperature range 10--300 K. We observed absorption peaks whose maximum energies E_m , ranging from 1.498 to 1.485 eV decrease as the temperature increases from 10 K to 100 K. The peaks for both SI and n-type GaAs disappeared above 100 K. Extrapolating the graphs of E_g-E_m versus temperature, we observed that near bandedge absorption is overlapped by the conduction band at about 220 K and 260 K for n-type and SI samples, respectively. Furthermore, we demonstrated that the absorption in the region of near bandedge can be photo-quenched using further irradiation after EL2 photo-quenching at higher temperatures. Comparison of the absorption measurements with the spectral photo-current measurements, we conclude that Reverse Contrast (RC) centres that cause such absorption at energies close to the bandedge have no intra-centre transition.

Key Words: GaAs, near bandedge absorption, reverse-contrast

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