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BEAM INDUCED VARIATIONS OF GaAs CATHODOLUMINESCENCE : EFFECT OF HYDROGEN AND DEFORMATION

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We use cathodoluminescence (CL) in a scanning electron microscope to study deep level recombination in semi-insulating GaAs. Two kinds of specimens were examined (i) as-grown crystals before and after hydrogenation, (ii) crystals deformed at high temperatures before and after hydrogenation. Hydrogen is introduced into the crystal using a R.F. hydrogen plasma ($T = 240^{\circ}\text{C}$, $t = 90$ min.). A consequence of the introduction of hydrogen is a substantial increase of the light emitted under the electron beam, due to a passivation of deep level centers [1].

For a static beam, the CL intensity decays with time in as-grown crystals whereas it increases towards a maximum in the same hydrogenated crystals; for long time, the light emission finally decreases. In deformed crystals, and before hydrogenation, the CL intensity is time independent whereas after hydrogenation it decreases. The characteristics of the variations depend of the beam parameters (intensity, energy). The phenomena are due to defect redistributions which alter the concentration of recombination centers, the defect mobility being enhanced by the electron bombardment. The similar variations have also been observed with a laser beam [2], [3].

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