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LBIC ANALYSIS FOR GRAIN-BOUNDARY CHARACTERIZATION IN INHOMOGENEOUS MATERIALS

H. EL GHITANI

Laboratoire de Photoélectricité des Semi-Conducteurs, Faculté des Sciences et Techniques de Marseille Saint-Jérôme, Université d’Aix-Marseille III, F-13397 Marseille Cedex 13, France

The interfacial recombination velocity $S$ of Grain-Boundaries (G.B.'s) may be evaluated by means of LBIC scan line at wavelength $\lambda > 940$ nm using a finite diameter light spot. ZOOK /1/ has proposed a method to determine $S$, based on the photocurrent attenuation within a G.B., assuming that the minority carrier diffusion length $L$ in the grains is constant. This assumption is not experimentally verified and causes large errors in the $S$ evaluation.

A model has been developed, using the Green's function method, to compute the LBIC profile at different wavelengths taking in account the local variation of $L$ determined experimentally. This model is valid for different spot diameters and for different thicknesses of samples.

Experimentally, arrays of small diodes ($2 \text{ mm}^2$) realized in G.B. containing regions of the material were used to draw the LBIC scan lines and to measure effective diffusion length of minority carrier by the S.P.V. method at different distances from a given G.B. Details of the experimental technics have been given previously /2/.

Figure 1 shows the experimental values (●) of the normalized photocurrent within a G.B., and curve 2 is the profile computed with the present model, while curve 1 is that computed by means of ZOOK's method.

A fairly well agreement is obtained between the experimental points and the model, particularly in the vicinity of G.B.

Directly from the attenuation of photocurrent at G.B.'s the $S$ values can be obtained.

References

Fig.1. Photoelectric profile near a G.B. (1) Zook's model (2) Present model. ●Experimental results.