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Measurements method to obtain lifetime profile using OCVD

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Abstract

In this work, the results of effective lifetime in epilayer are presented. The technique makes use of a four-terminal bipolar test structure to electrically define the epilayer volume where recombination occurs and employs the open circuit voltage decay method (OCVD) for lifetime parameters extraction. This method offer the capability to depurate measurements from the parasitic ohmic effects, the technique is able to measure the ambipolar and minority carrier lifetime along epilayer at high and low injection levels respectively.

The most widely used methods for carriers lifetime extraction are Open Circuit Voltage Decay (OCVD)[1] and Reverse Recovery (RR) because of their straightforward interpretation and the simple structure test involved in the measurement [2]. The carrier lifetime is a fundamental parameter for today's semiconductor industry since it influences dramatically the performances of many devices, such as silicon-on-insulator (SOI), power devices and solar cells. Beyond, it is one of very few parameters giving information about the low defect densities consistent with extremely clean materials [3] .
At the figures 1 and 2 are shown results of the measure of recombination lifetime for two commercial semiconductors of base nn+, and the method is developed and compared with the traditional OCVD method.

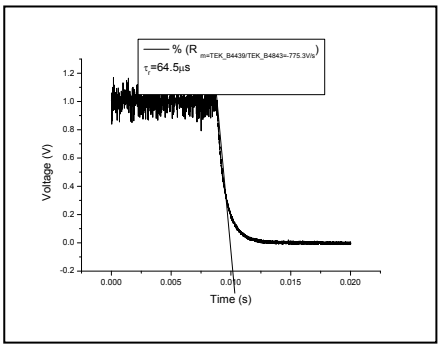

Figure 1: Recombination time for the diode R.

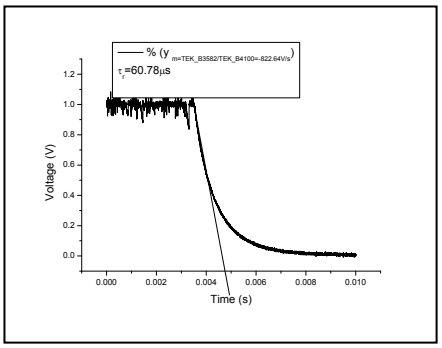

Figure 2: Recombination time for the diode y.

References

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