**ELECTRONIC STRUCTURE OF NANO LAYER CREATED BY IMPLANTATION OF Al IONS IN GaAs**

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Ion implantation is a very common method for doping semiconductor materials since the doping profile is easily controlled compared to dopant diffusion methods. The very same technique can be used to bombard material with ions to electrically isolate them .

For this work two different kinds of GaAs based wafers were used. One version is a Vertical Cavity Surface Emitting Laser (VCSEL) wafer which consists of two Distributed Bragg Reflector structures (DBRs), with an intermediate GaAs region containing three InGaAs quantum wells, on top of the GaAs bulk. Throughout this thesis this structure will be referred to as the “VCSEL structure”. below shows an SSRM scan of the VCSEL structure where one can clearly distinguish the DBRs. The implantation isolation of the VCSEL structure is of most interest since a detailed knowledge of how ion bombardment affects the actual DBR structures is desired.

Conclusion since SSRM is a qualitative method it is hard to establish a quantitative correlation between measured resistivity data and simulated defects without further calibration measurements, for instance secondary ion mass spectrometry. The SSRM measurements in this work only offers relative values of resistivity, i.e. no calculations of actual damage (vacancy distribution) created by the ion implantations could be performed. Even though the periods in the DBR structures of the VCSEL offers a background pattern which aids depth identification and orientation, by allowing one to count the periods of known size and thereby attain the depth, the advanced doping profiles of each of the periods can also be a source of problem since the effect of the penetrating ions can be altered.