

Lateral diamond Schottky diodes on heteroepitaxial substrate

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One of the major reproach for diamond power device in comparison with other semiconductor materials is the substrate size. For example, for High Pressure High Temperature (HPHT) substrate used to create power devices, the size is currently 4x4mm², which is far away from the silicon technology (wafer of 450mm). One way to overcome this issue is to use heteroepitaxial diamond substrates. Some similar works have already been done by different groups around the world [1], [2]. The French consortium DIAMWAFEL is actively working on diamond heteroepitaxial films grown onto Ir/SrTiO₃/Si(001) substrates [3]. The crystalline quality reported for this heteroepitaxial material is at the state of the art [4]. Nevertheless, an electrical characterization is needed to check if this material is suitable for power device application.

To do so, we firstly grew a slightly doped p-type layer (10^{16} atoms.cm⁻³) on the as received substrate to obtain an active layer on top of the thick intrinsic layer already grown. After that, Schottky and ohmic contacts have been deposited as you can see on figure 1 a). The purpose of this study is to electrically characterize this new material by using the lateral Schottky diodes created. In that matter, we performed some current-voltage (I-V) measurements under different condition as well as capacity-voltage (C-V) ones an example is shown in figure 1 b). Those results will be presented and discussed in this work.

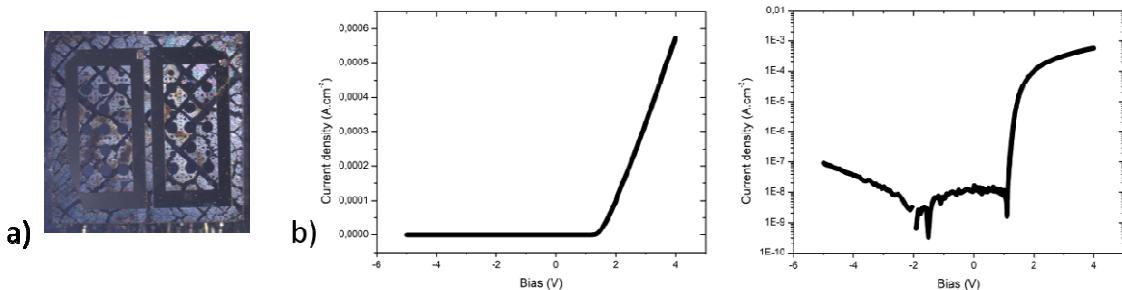


Figure 1: a) sample picture and b) I-V characteristics at room temperature with linear scale on the left and logarithmic scale on the right

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