

## Rhenium epitaxial nanowires

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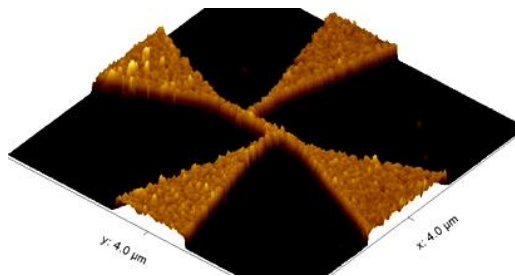
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This work has been performed in the frame of the realization of superconducting quantum circuits based on Josephson junctions. Currently, the superconducting quantum circuits are realized with Aluminium which is easily evaporated. Nevertheless, the thin films of Aluminium are polycrystalline and have a poor crystallographic quality. This gives rise to limitations of the characteristics of the circuits. In order to obtain better performances, we are preparing our superconducting thin films by molecular beam epitaxy. The rhenium has been chosen because the lattice mismatch between rhenium and sapphire [0001] is small. The quality of the layer as well as the interface between sapphire and the rhenium is very high. Moreover, the rhenium does not oxidise, leading to clean interfaces.

We present the epitaxial growth and the structural characterizations of the rhenium thin film. Starting from these epitaxial films, we have realized the fabrication of nanowires down to 50 nm using electron beam lithography. Critical temperature, critical current and fluctuations around the superconducting transition measurements have been performed as function of their widths.



**Figure 1** : Rhenium nanowire onto a sapphire substrate.