

FABRICATION AND MEASUREMENTS OF NIS JUNCTIONS TO CHARACTERIZE PLASMA ETCHING

NICOLAS PAILLET

Aalto University

11 August 2015

THE NANOWIRES PROJECT

Introduction

Two types of InAs Nanowires coming from Copenhaguen :

- Without barrier, and covered with Al
- With InGaAs barrier, without Al

For the covered ones :

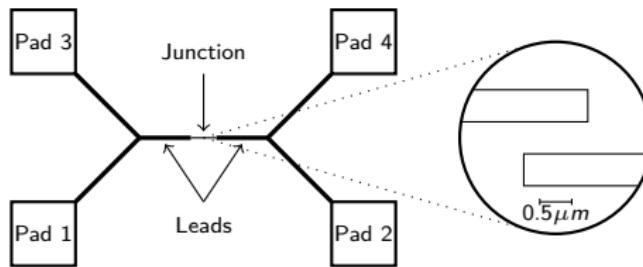
- Al heavily oxidized by the travel
- Get rid of this oxide by Plasma Etching
- Fabrication of NIS structures to characterize the Plasma

THE BEGINNING

Lack of rigour

First we made some tests that are not very relevant :

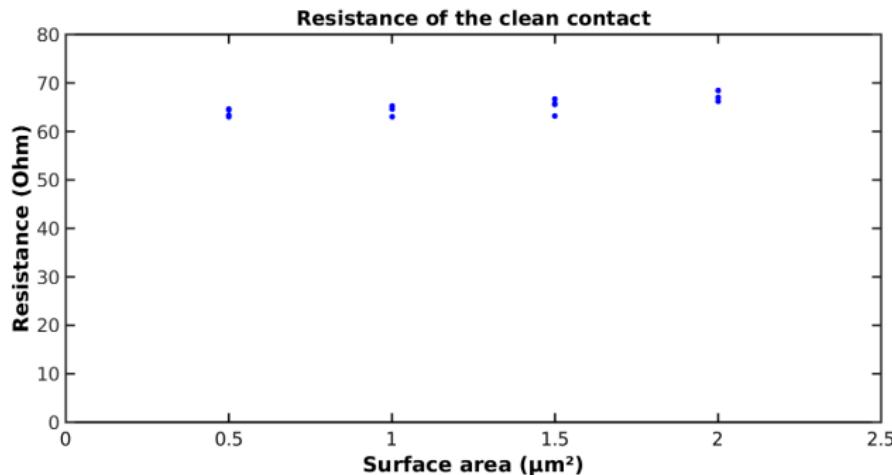
- Two pad patterns \Rightarrow not handy for 4 probe measurements
 - Measurements made with bounds with Matlab
- \rightarrow Not efficient nor relevant
- \Rightarrow Need of a more systematic protocol
- \rightarrow Design of a new pattern
- \rightarrow Measurements with a probestation



REFERENCE SAMPLES I

Room temperature measurements

- Clean Contact Al + Cu

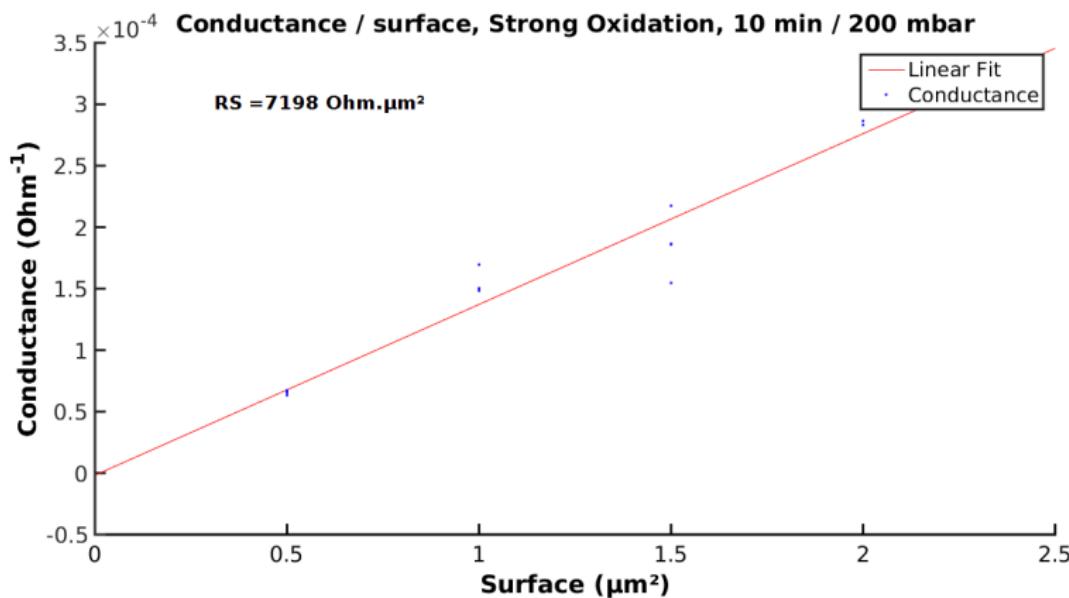


$$R = \sum_{Cu,Al} \frac{\rho l}{S} \simeq 78\Omega$$

REFERENCE SAMPLES II

Room temperature measurements

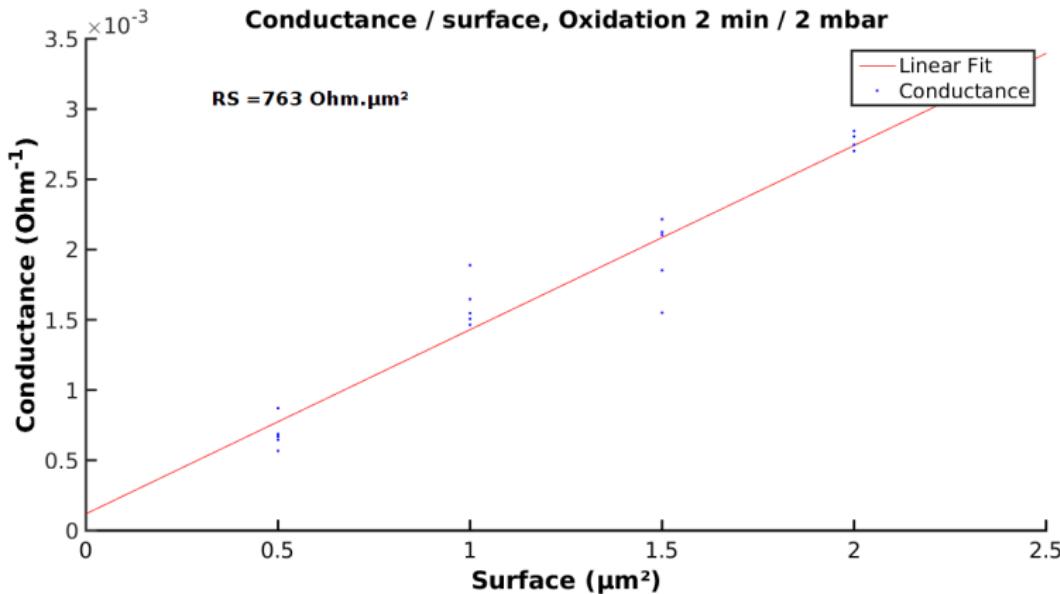
- Strong Oxidation reference 10min / 200mbar



REFERENCE SAMPLES III

Room temperature measurements

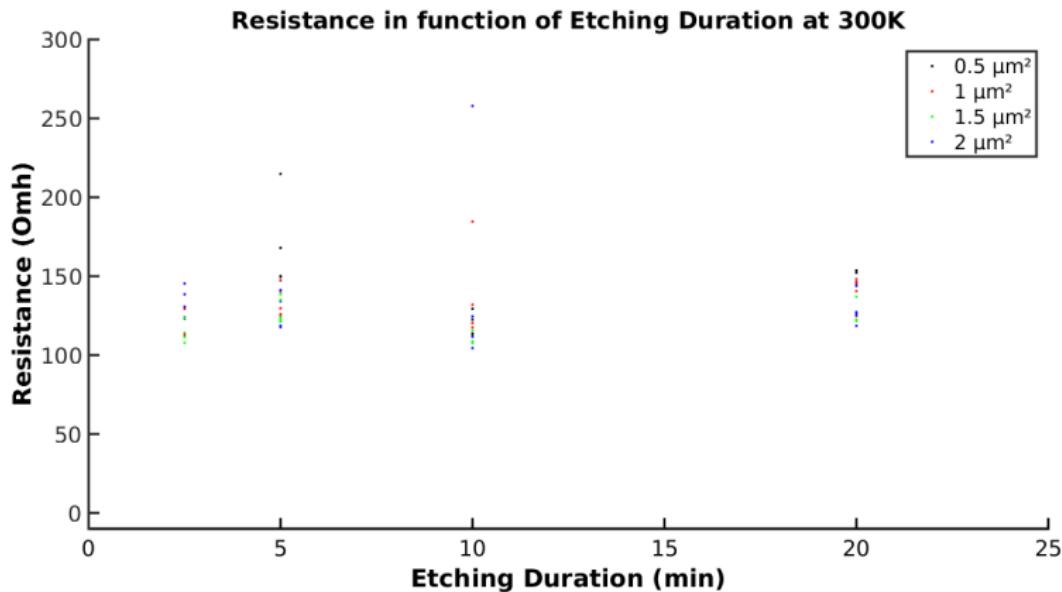
- Regular Oxidation Reference 2min / 2mbar



PLASMA TESTS |

Room temperature measurements

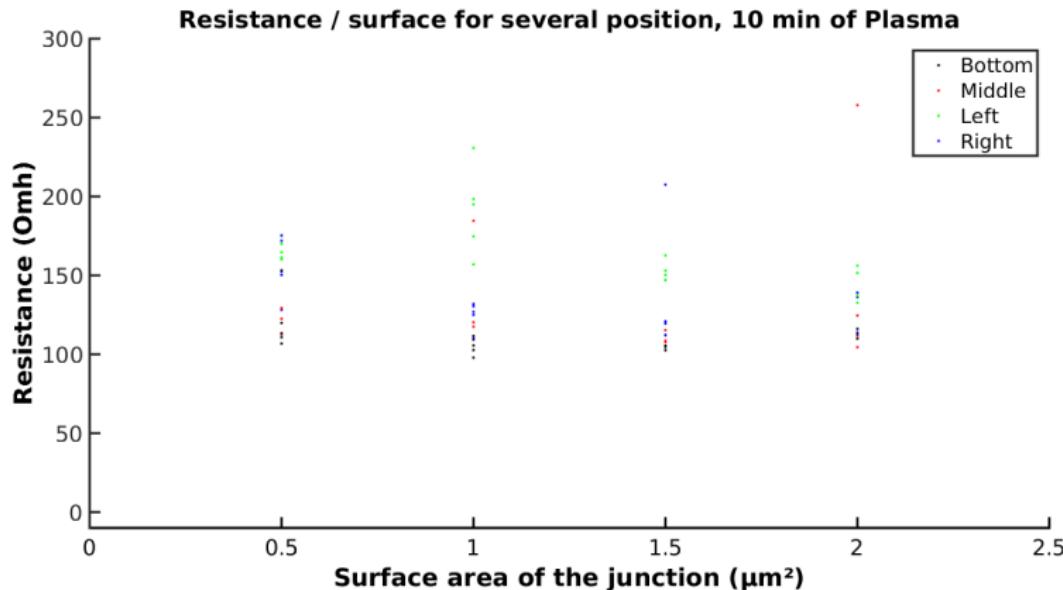
- Time of Plasma



PLASMA TESTS II

Room temperature measurements

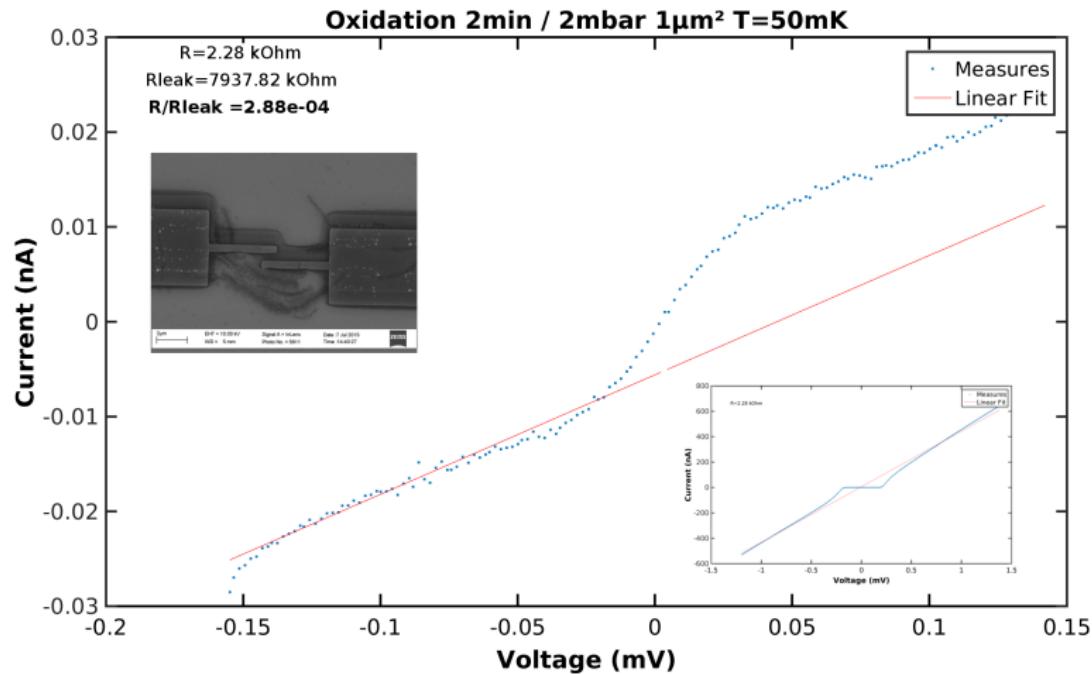
- Position of the sample



BEFORE THE LISA MAINTENANCE I

Low temperature measurements

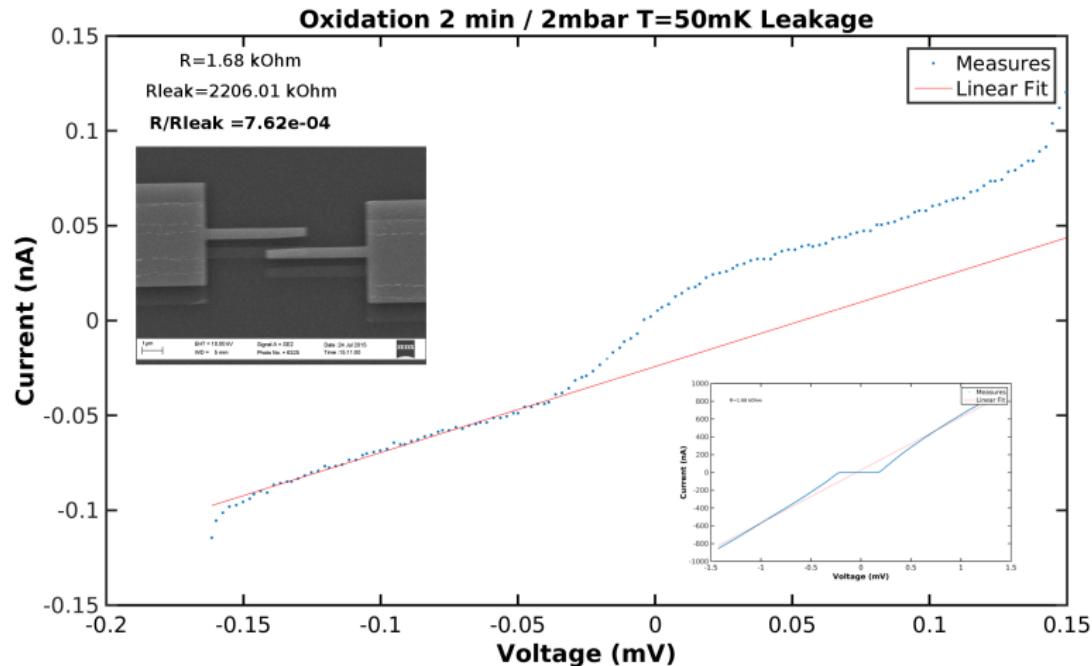
- Regular Oxidation 2min / 2mbar NIS



AFTER LISA MAINTENANCE I

Low temperature measurements

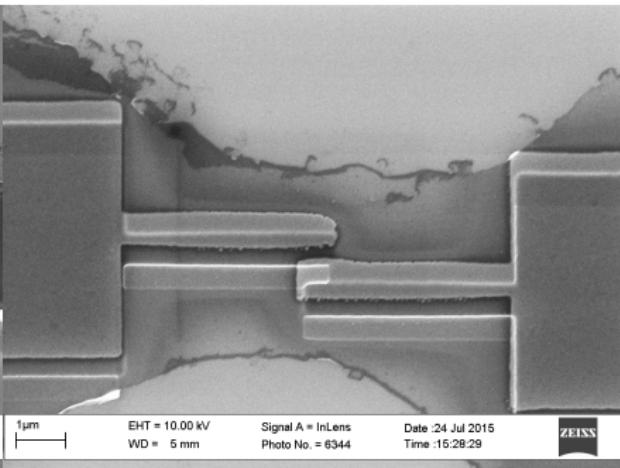
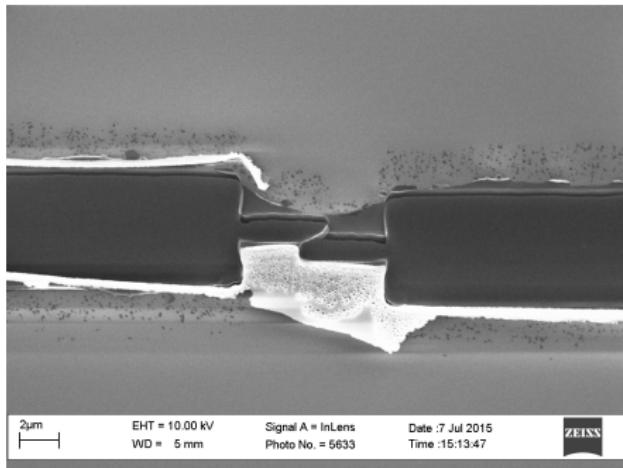
- Regular Oxidation just after the maintenance



AFTER LISA MAINTENANCE II

Low temperature measurements

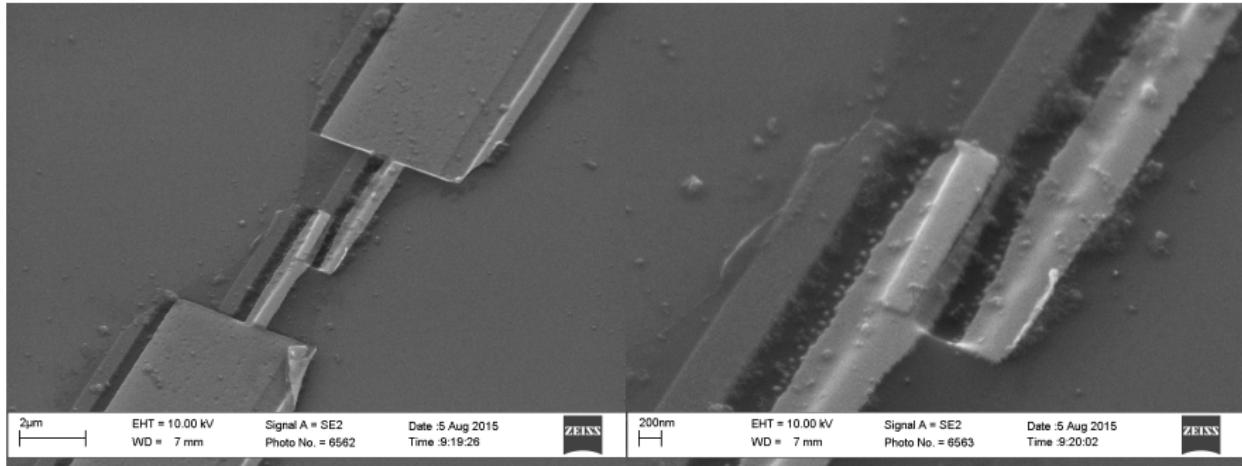
- Burned Samples with 10 min of plasma



AFTER LISA MAINTENANCE III

Low temperature measurements

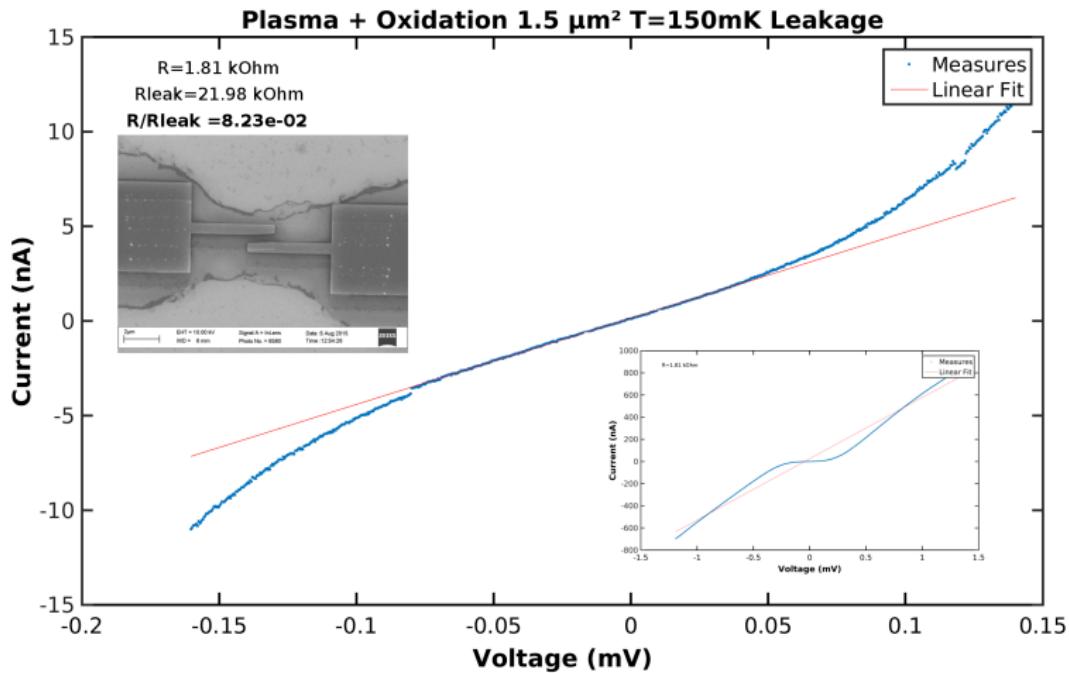
- Wafer etching : 10 min of plasma is too much



AFTER LISA MAINTENANCE IV

Low temperature measurements

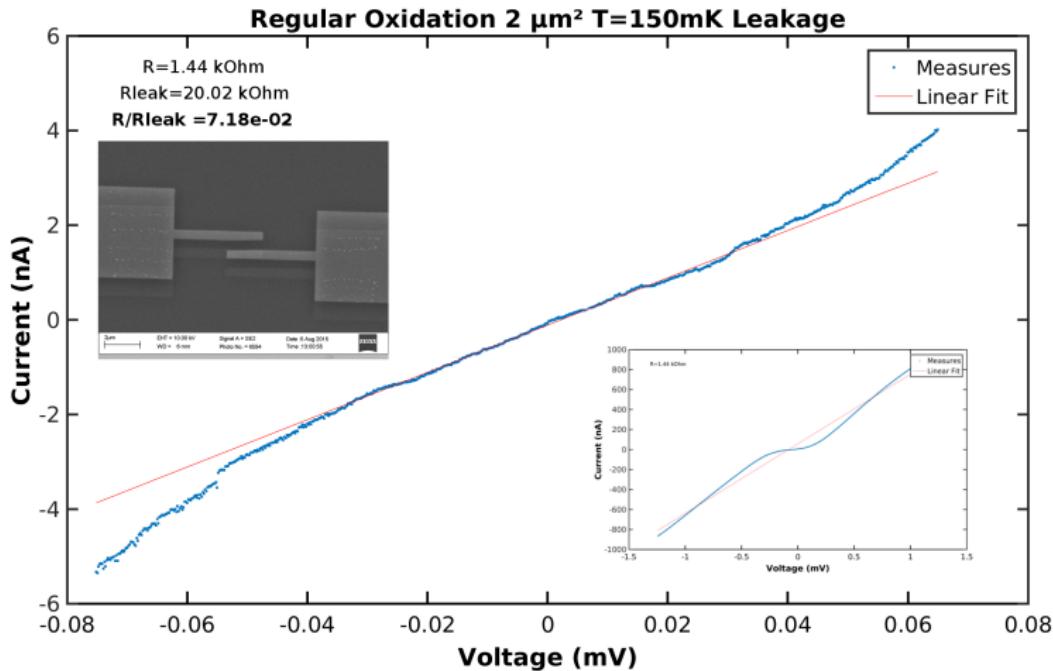
- Plasma Oxidation



AFTER LISA MAINTENANCE V

Low temperature measurements

- Regular Oxidation reference for previous sample



CONCLUSION

Thank you for your attention !

If you have any questions please ask.