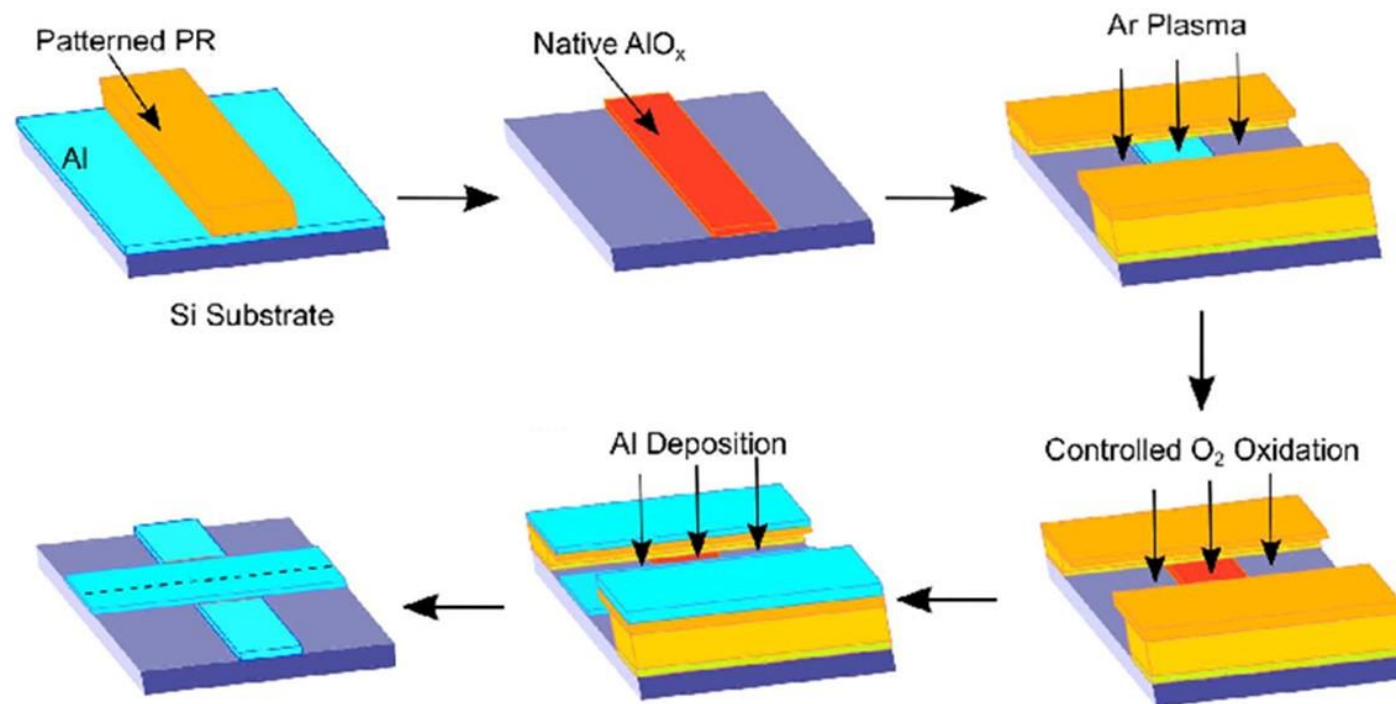




Josephson Junctions

Room temperature
measurements

JJs at RT



Josephson junctions fabrication process

JJs at RT

- The first test for JJs is a room temperature (RT) measurement of the resistance

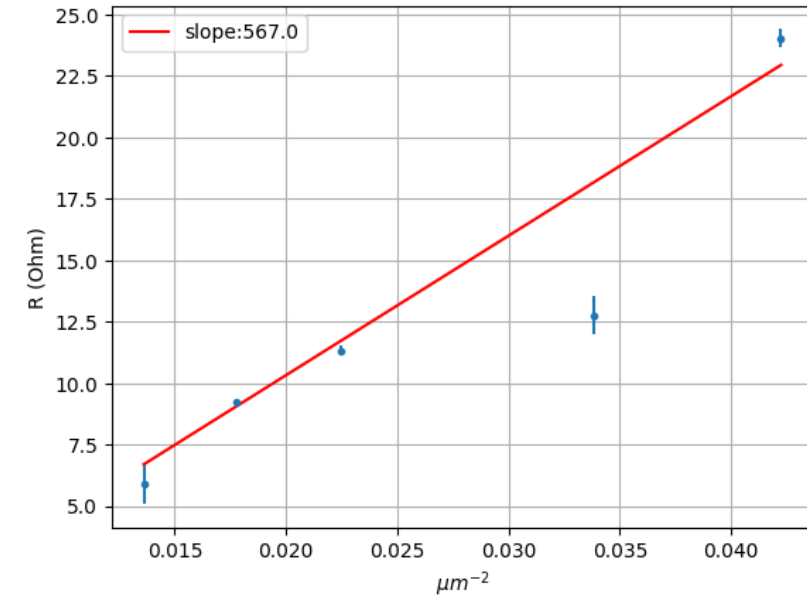
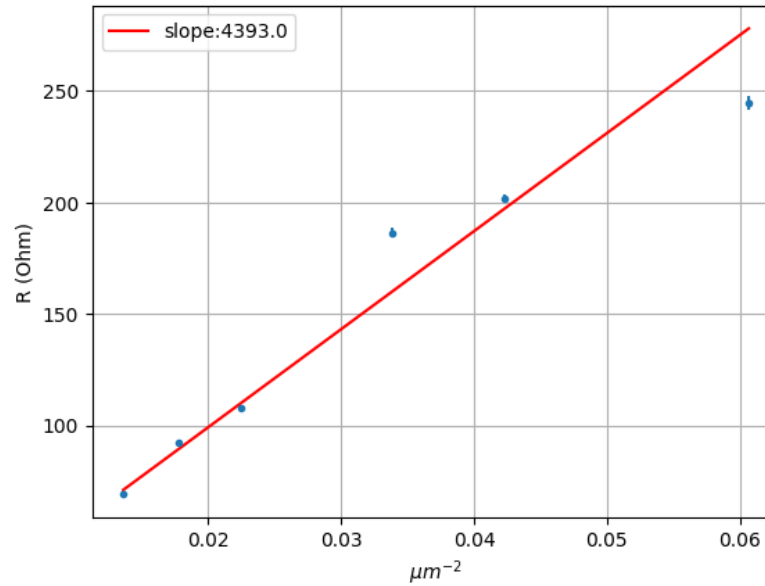
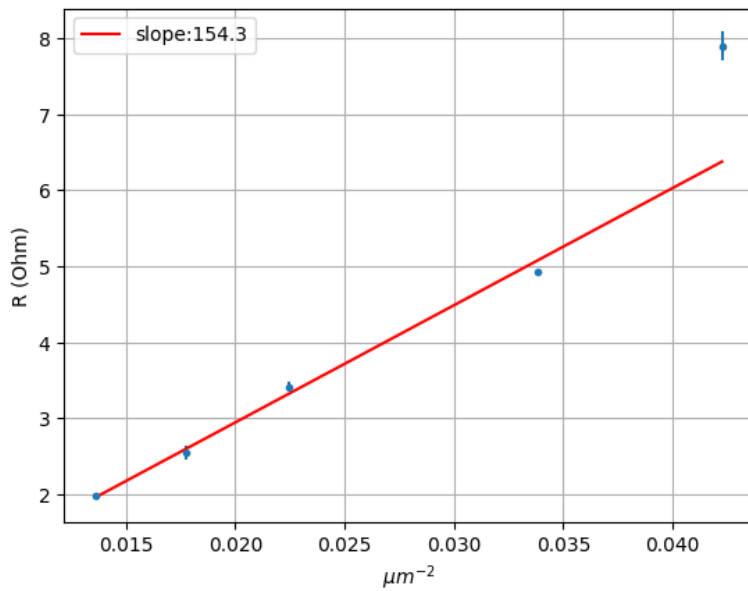
Why?

1. We need to calibrate our fabrication recipe – specifically the **oxidation dose** – in order to get the junctions we want.
2. The RT resistance must scale with the oxidation dose and with the junction's area.
3. Once we control the scalings we can tune our processes to our needs.

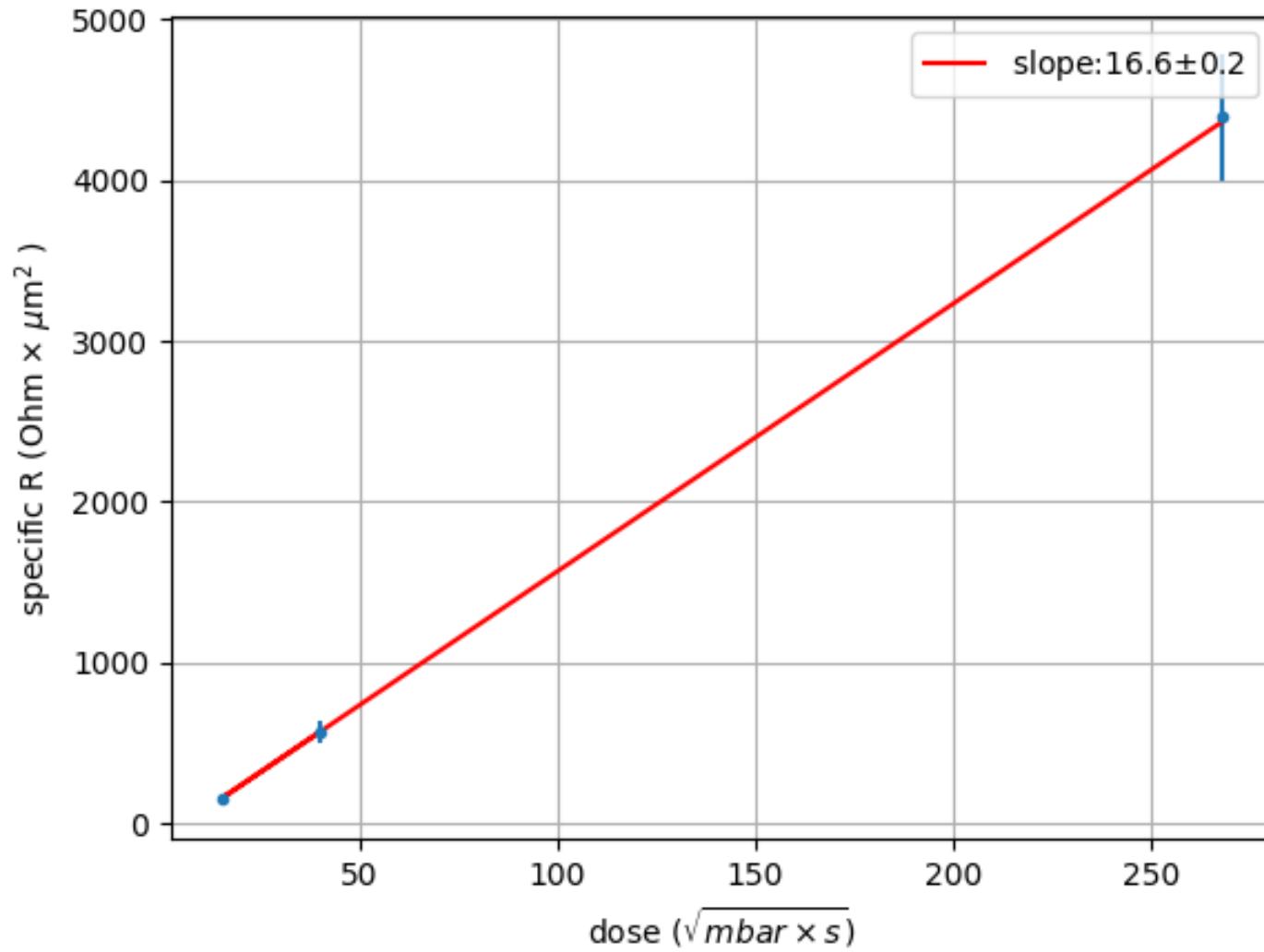
$$I_c = \frac{2eR}{\pi\Delta} \quad \rightarrow \quad E_j = \frac{2e\hbar I_c}{2e} \quad \rightarrow \quad \frac{E_j}{E_c}$$

JJs at RT

We made 3 wafers with different oxidations containing various JJs sizes and measured their R



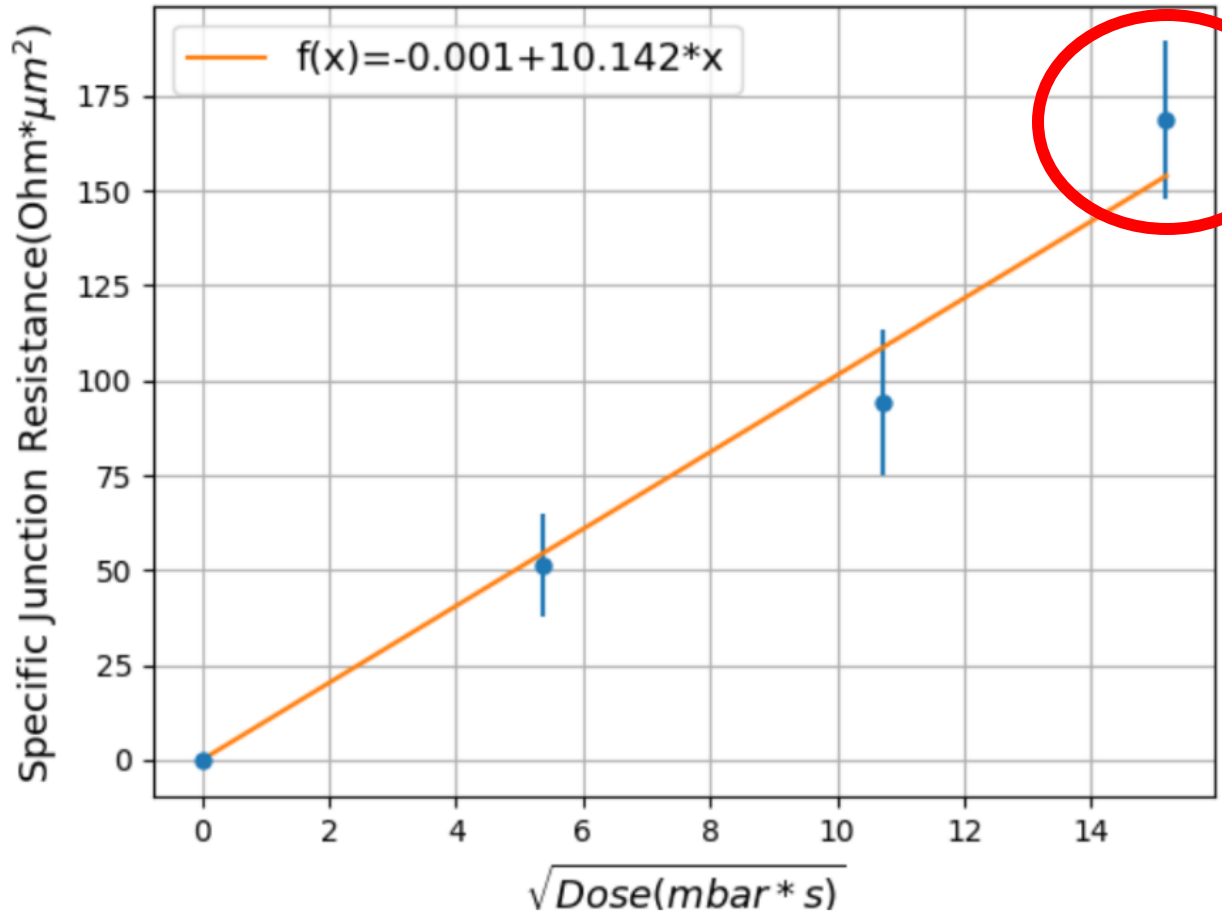
JJs at RT



Backup

Run	Design	Wafer	Al layer 1	Etching	Litho 2	Hard bake	Flash	Cleaning	O2 pressure / mbar	Oxidation time / minutes	Dose / mbar*min	Al layer 2	Lift-off
JJ-Easy-1	Mask JJ TECH 2023	w1	Kenosistec 80 nm	Wet etching (CR-M)	LOR 5A (standard) + normal 1.2	No	Yes 1'20"	Ar cleaning 25 min	8.00E-02	48	3.84	Kenosistec, 150 nm, 409 s	DMSO + Acetone with ultrasound and IPA
		1.5							15h?	1,365.00			
		1.5							20" ramp + 8' static	27.00	DSMO with ultrasound		

Backup



oxidation dose (dynamic) also used in JJ_Easy_w1

JJ_Easy_W1 : $\approx 154 \text{ Ohm} * \mu\text{m}^2$
Juventus : $\approx 170 \text{ Ohm} * \mu\text{m}^2$

