N infusion cavity development at DESY & HiGrade Measurements

Marc Wenskat (on behalf of many!)

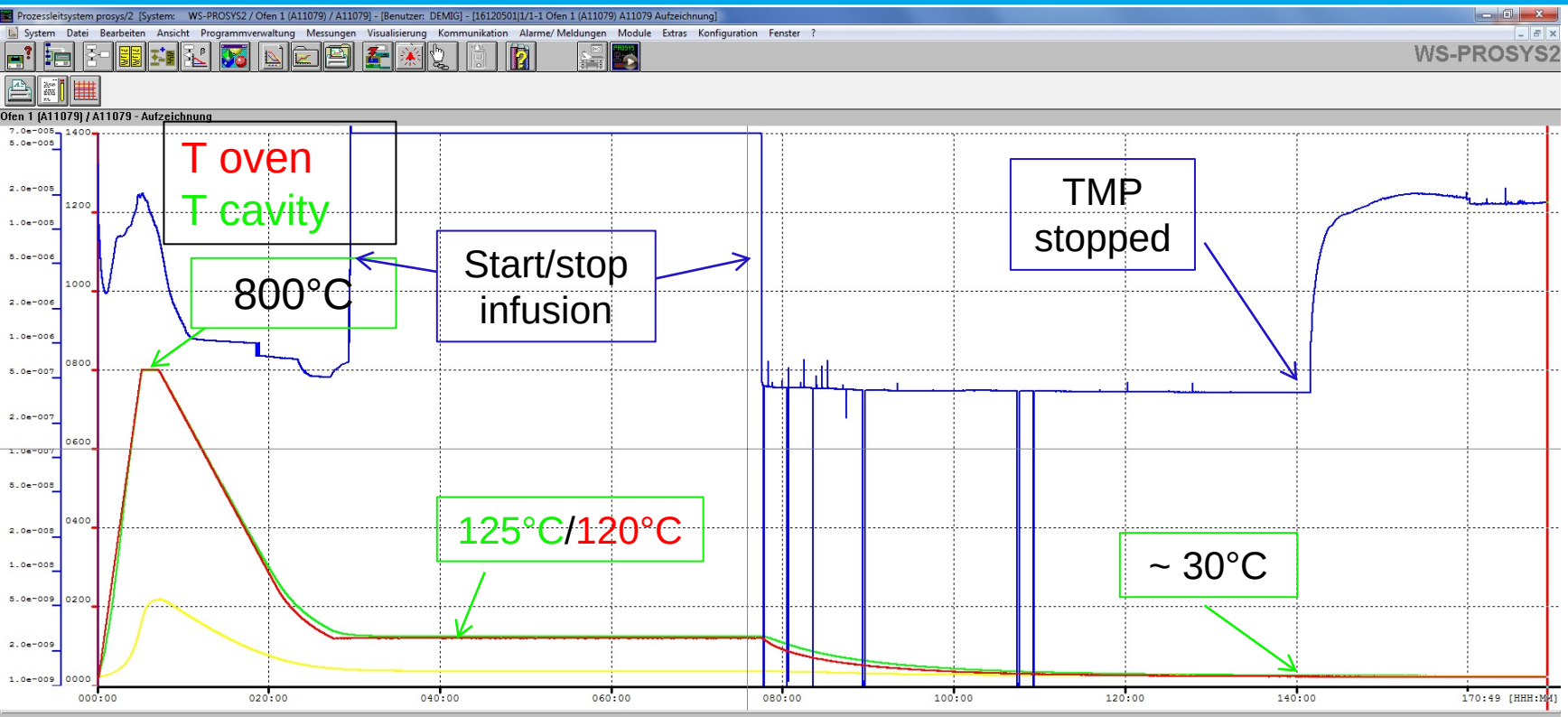
TTC HG Meeting

8.6.2017

HELMHOLTZ GEMEINSCHAFT

DESY

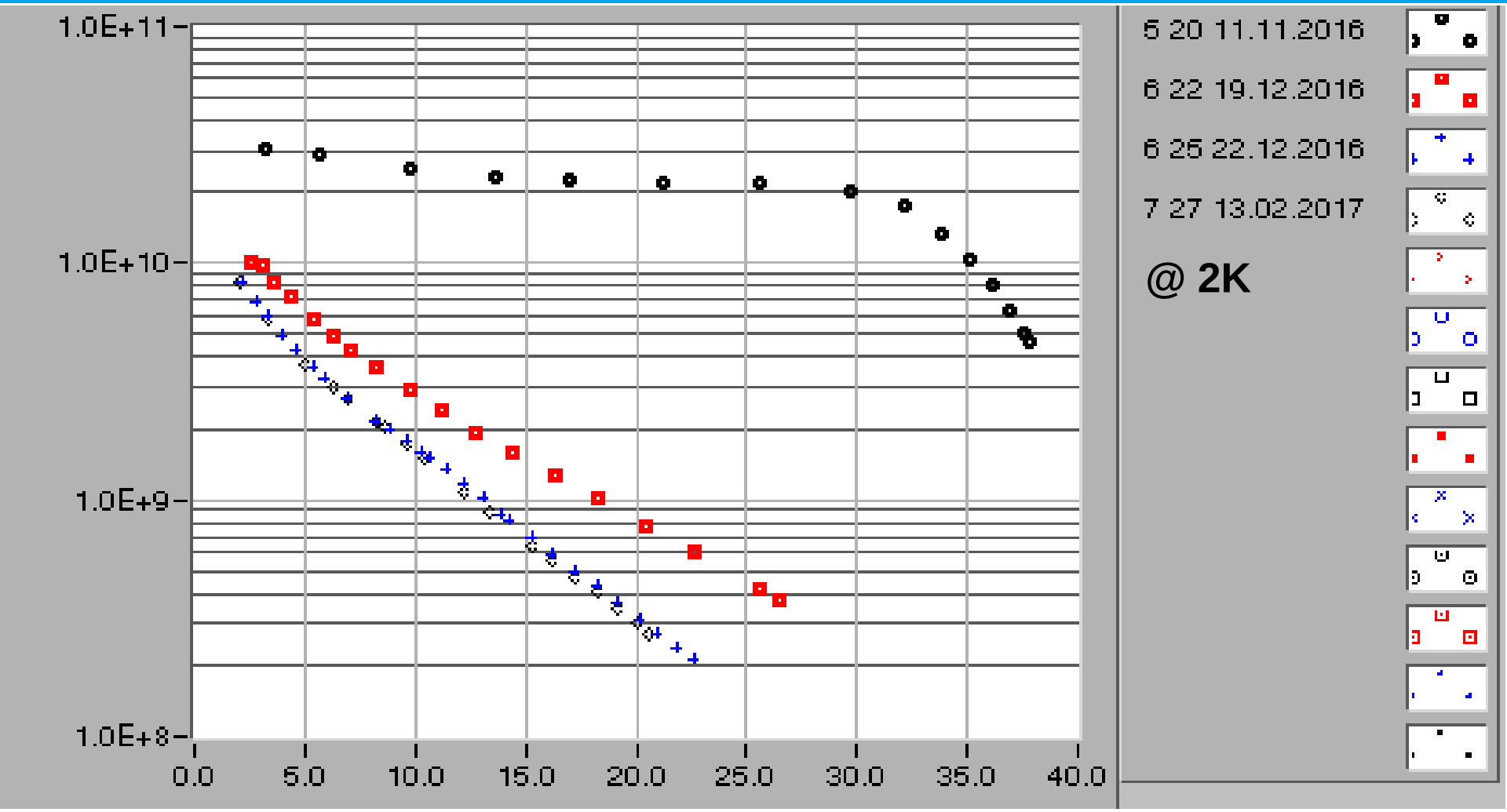
Full procedure



Infusion Recipe	Measured
800°C @ 3h, p ≈10^{-6} mbar, cool down	800°C @ 2h, p ≈10^{-5} mbar, cool down (slower?)
120°C @ 48h with	120°C @ 48h with
p_{N2}≈10^{-2} mbar	p_{N2}≈10^{-4} mbar

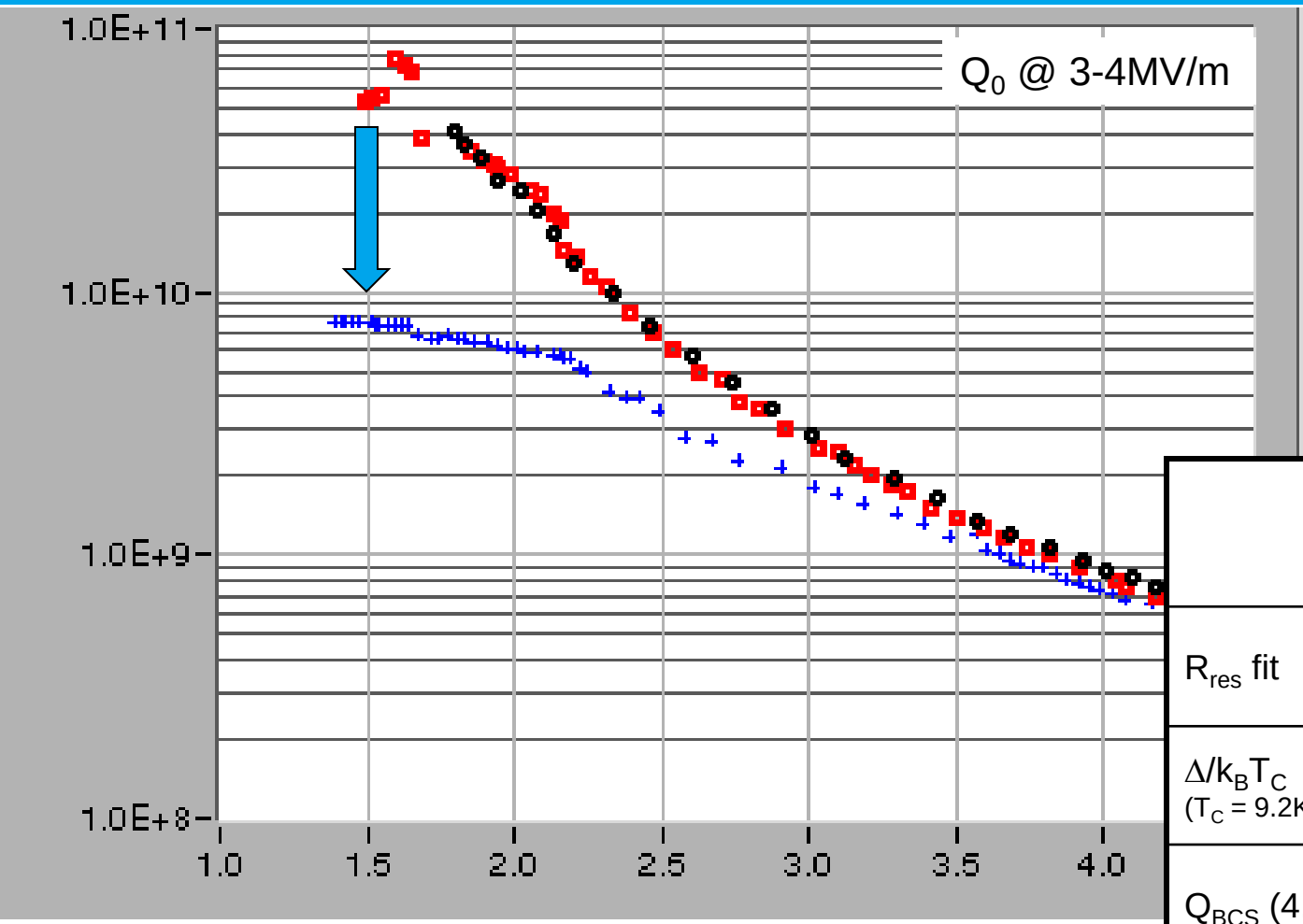
← Problems with location of gauge

1DE18 – Results – Q vs E



1) warm up across T_c to check for frozen flux
2) warm up to 150K and fast cool down

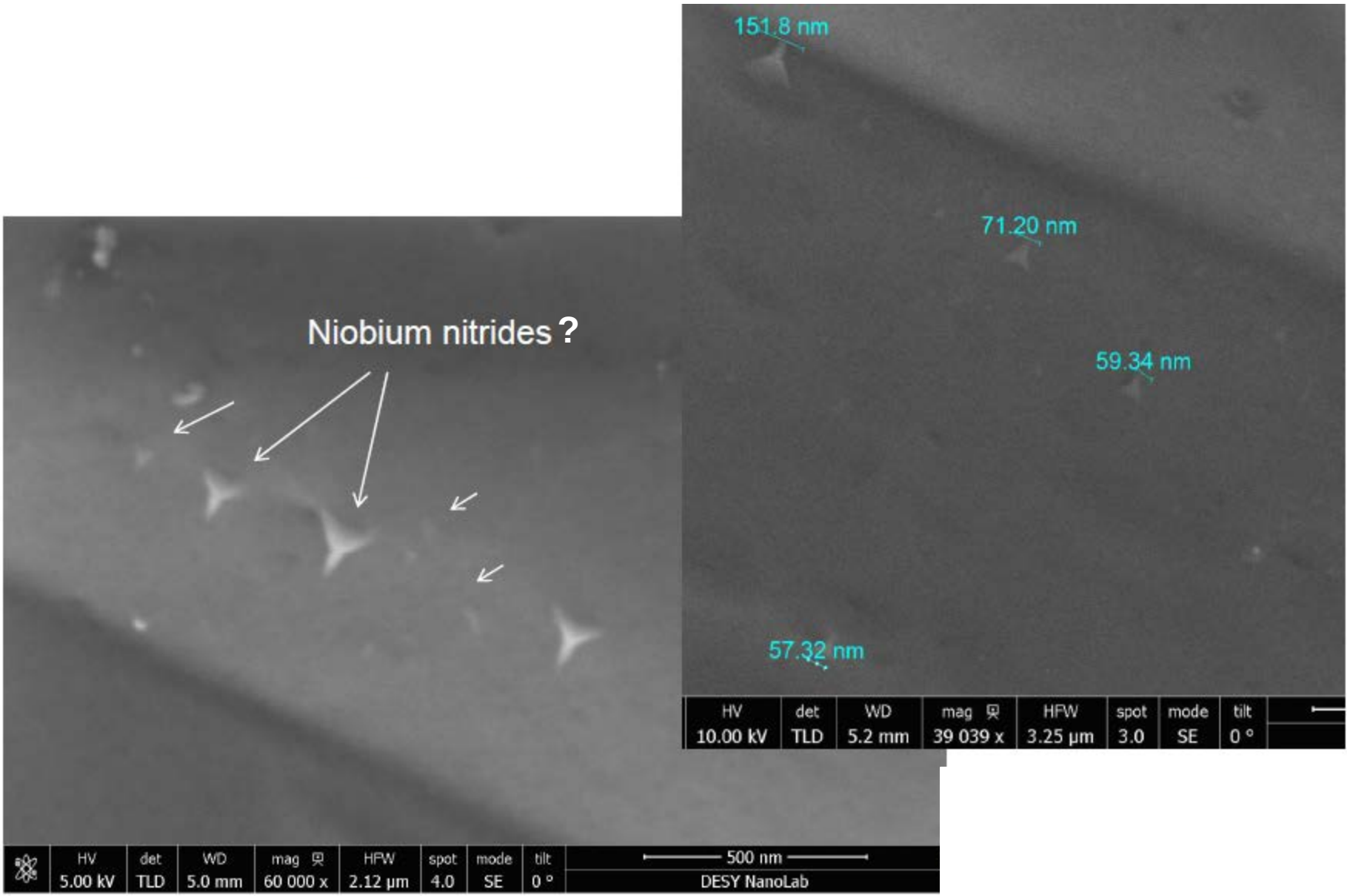
1DE18 – Results – Q vs T



	Test 4	Test 6 Add. HPR & N_2 treatment
R_{res} fit	3.4 nΩ	35 nΩ
$\Delta/k_B T_C$ (T_C = 9.2K)	1.97	1.79
Q_{BCS} (4.3K)	$6.8 \cdot 10^8$	$6 \cdot 10^8$
$Q_{0,max}$(1.8K)	$4.3 \cdot 10^{10}$	-
$Q_0(E_{acc}$ = 23.5 MV/m; 1.8K)	$3.1 \cdot 10^{10}$	-

Test 5 = Test 4 + HPR – re-commissioning of HPR – only QvsE@2K
No change of performance & no QvsT

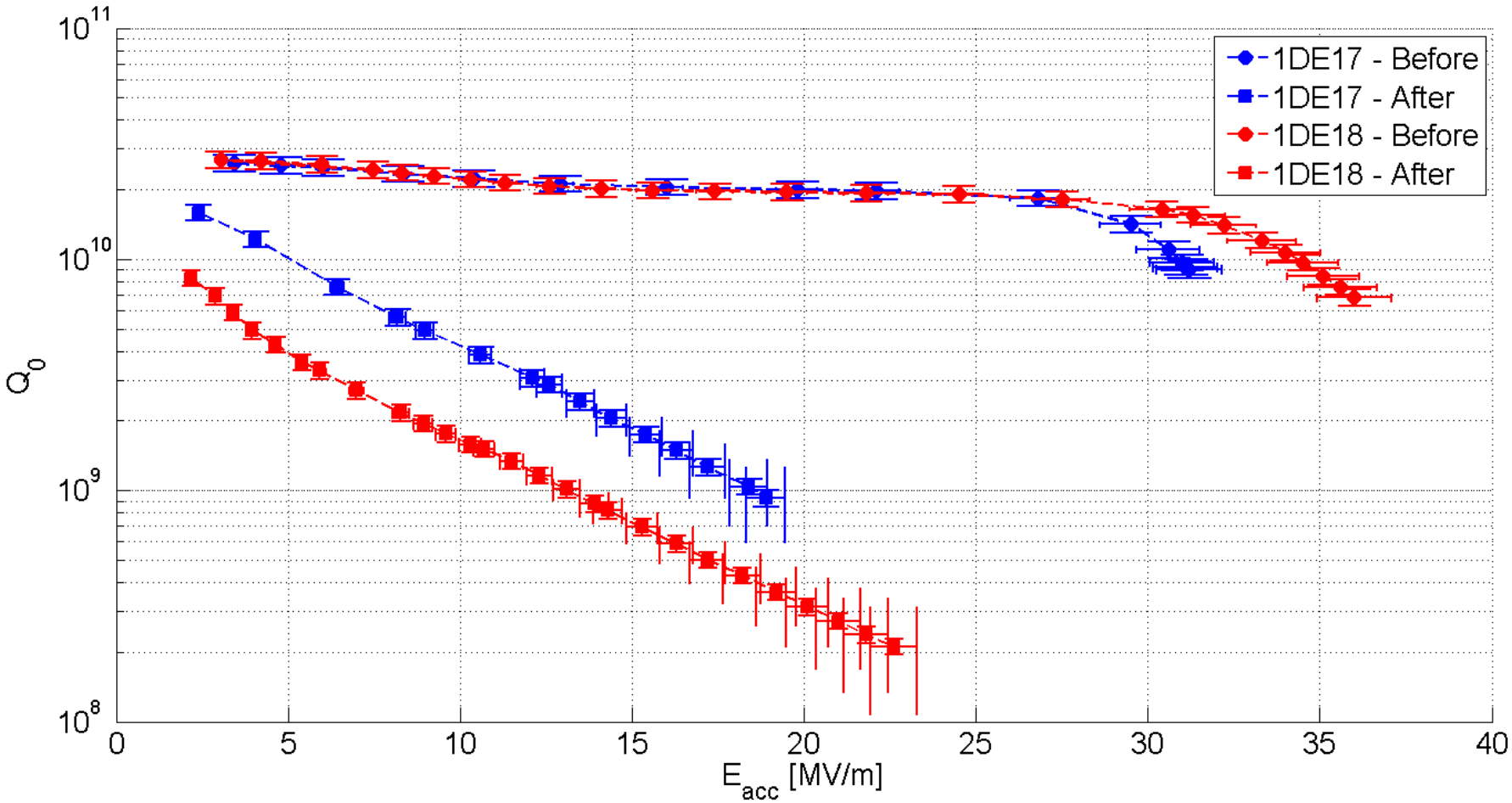
SEM of Sample of 1DE18



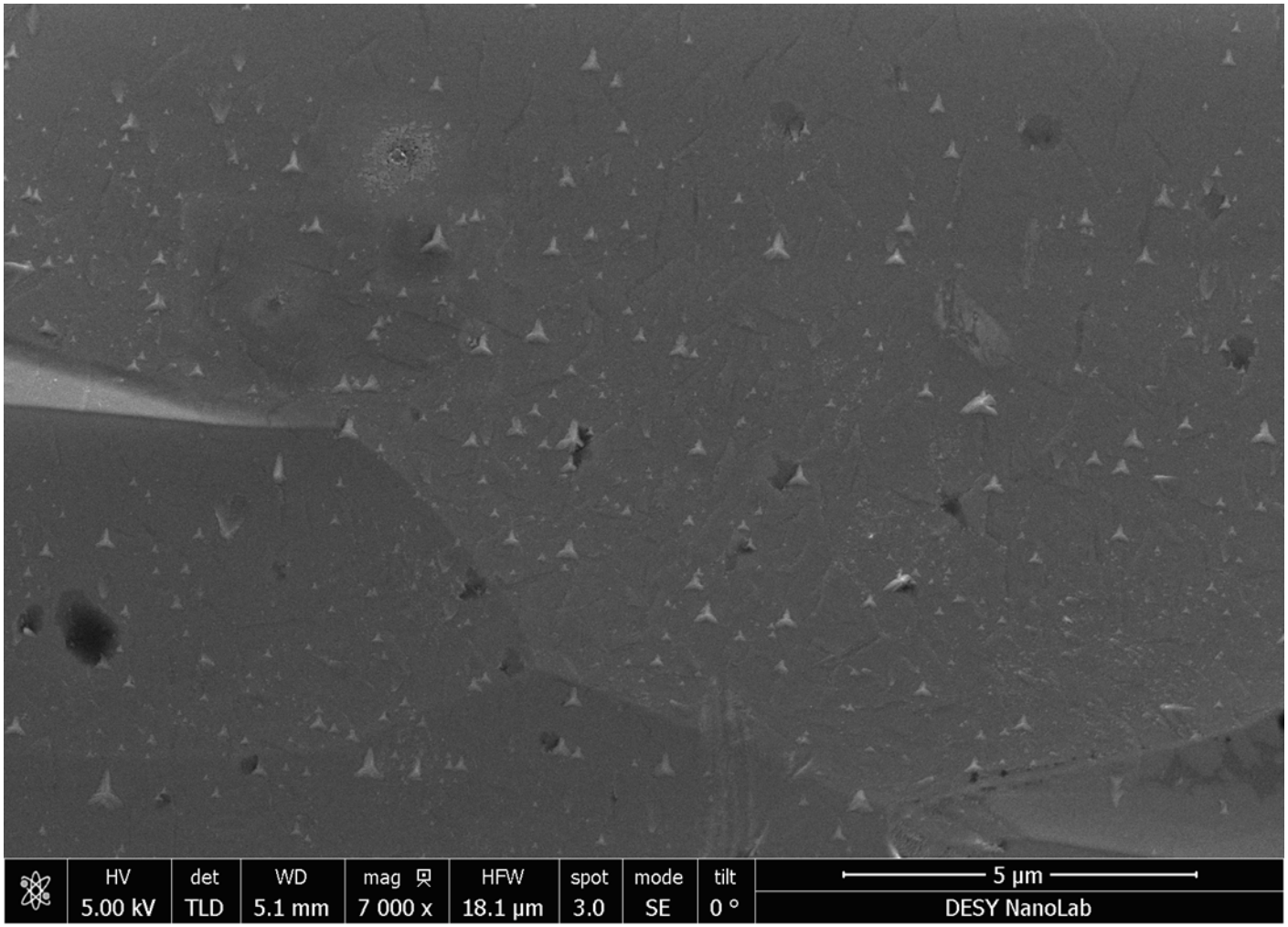
Check of procedure

> 2nd Cavity (1DE17) into oven – same T-cycle w/o Nitrogen injection

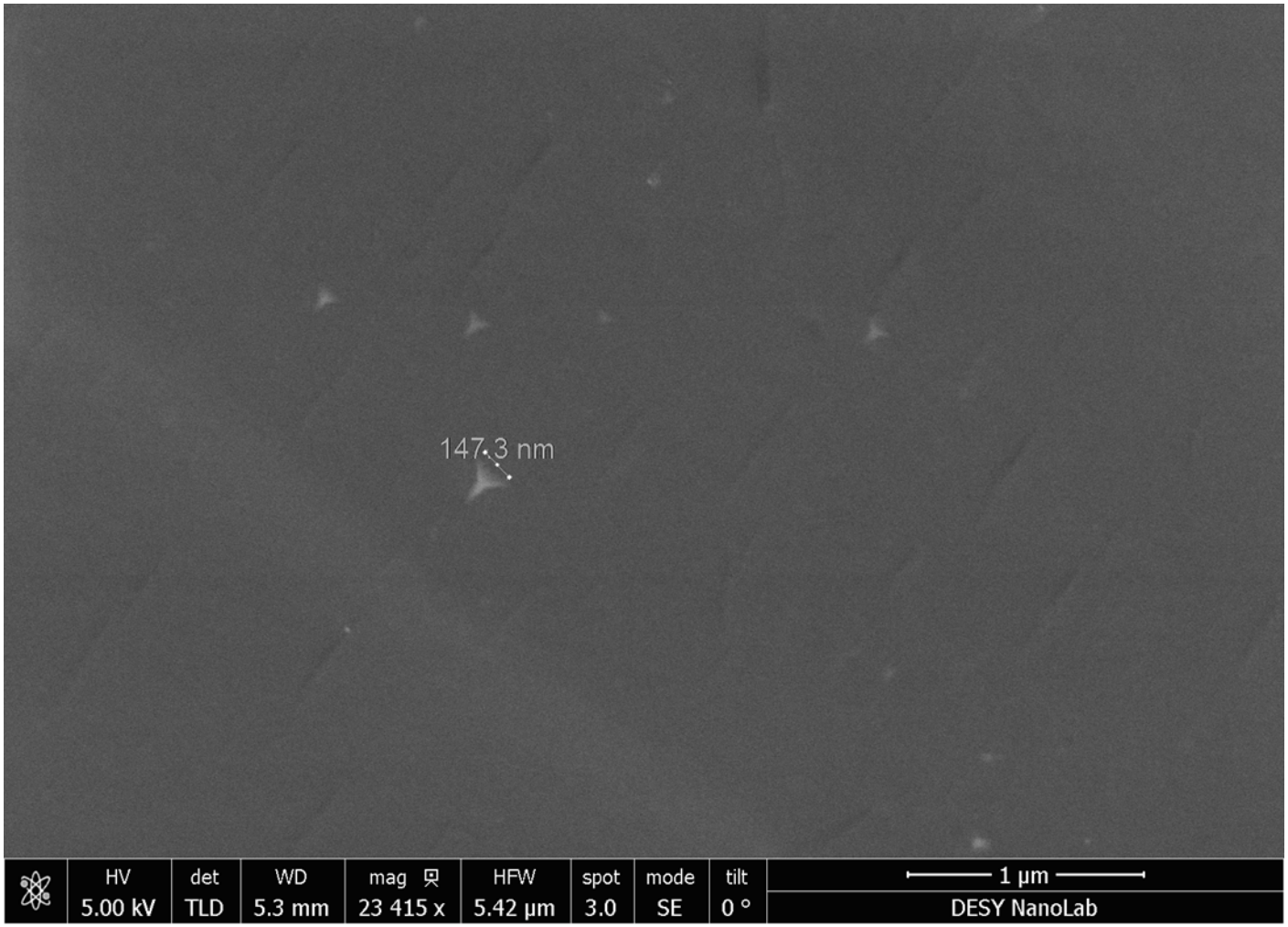
Comparison of tests before/after treatment



SEM of Sample – 1DE17



SEM of Sample Z84



Check of procedure

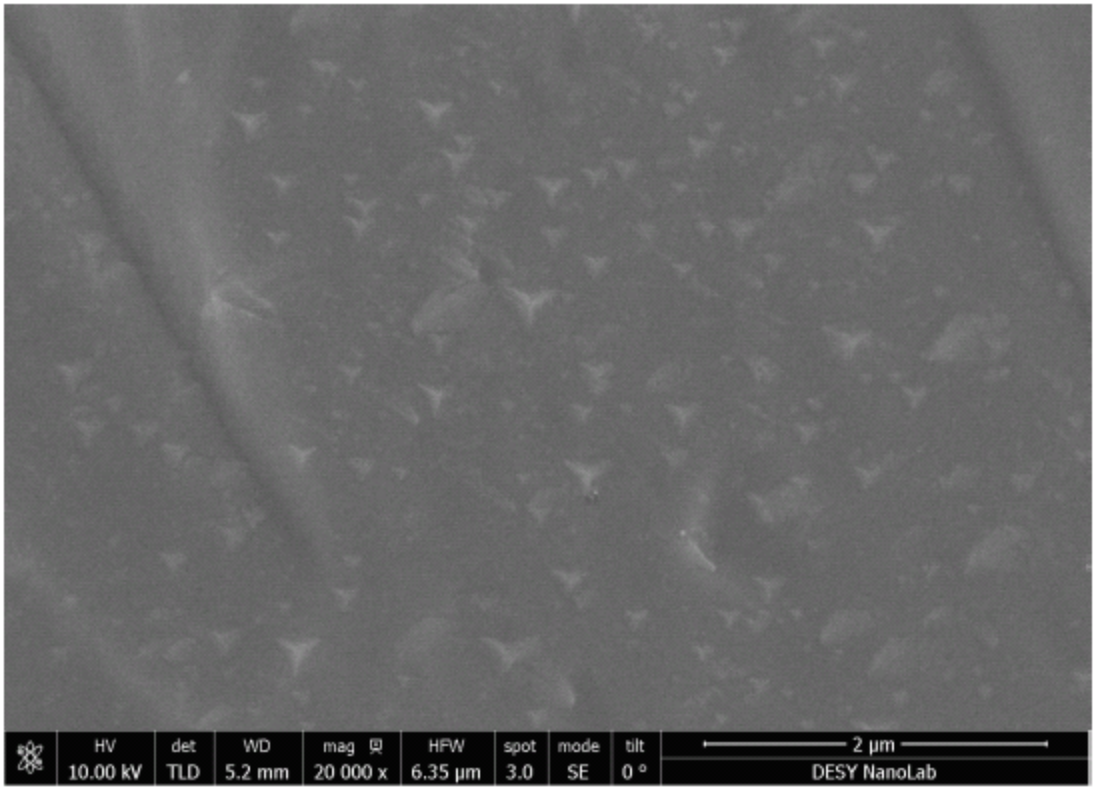
> 2nd Cavity (1DE17) into oven – same T-cycle w/o Nitrogen injection

> 3rd Cavity (1DE16) after some improvements of oven

- Lower pressure / better control of pumps

SEM of Sample of 1DE16

> No RF Test yet (next week)



Open Questions

- Are there any other groups who succeeded at Infusion?
  - Besides Cornell
- Did anyone tried a run w/o Nitrogen? What were the results?
- Should the cavity performance stay the same after T-cycle w/o N? aka: Does 800C w/o chemistry afterwards does not change the performance?
- Do we know that those “stars” are the cause of the deterioration?
  - Do we know its Nb_2N?
- Are we sure about the effect of the caps & the foil? (FNAL: Ti-Contamination vs. general)