



## **5<sup>th</sup> WP 15 meeting 22.05.2018**

University Siegen  
Institute of Materials Engineering  
Surface and Materials Technology

Dr. Michael Vogel

## Status at a glance:

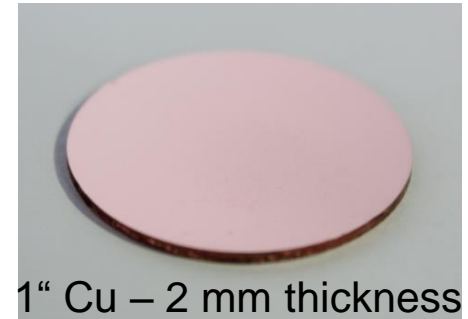
- Own sample - the 1" coins - deposition finished
- 1st batch of ARIES samples deposited and shipped
- Stewart Leith (EASITrain) is going to take over the coating and characterization work
- Four students works ongoing:
  - Nb coating
  - Nb characterization\*
  - 2 x Box-coater construction\*
  - RRR test bay CADesign started\*

\* Not discussed any further here

## BSc-thesis work by Tim Viereck:

### 1. sample production

1. Sheet metal punching
2. Grinding and mech. polishing



### 2. pretreatment, Nb coating and basic characterization

3. Cleaning
  - 3.1 Acetone, Ethanol and rinsing in distilled water → severe adhesion problems
  - 3.1 Nitric acid ( $\text{HNO}_3$ ) treatment → did the trick (no delamination)
4. **Coating**
5. Scratch test (adhesion testing and comparison)
6. SEM

**Status: evaluation and writing**

## 4. Coating

### Parameter field

Parameter	Max value (+)	Min value (-)
Power	100 W	500 W
Temperature	180 °C	650 °C
Substrate bias	0V	300 V

**Statistical design of experiment :**

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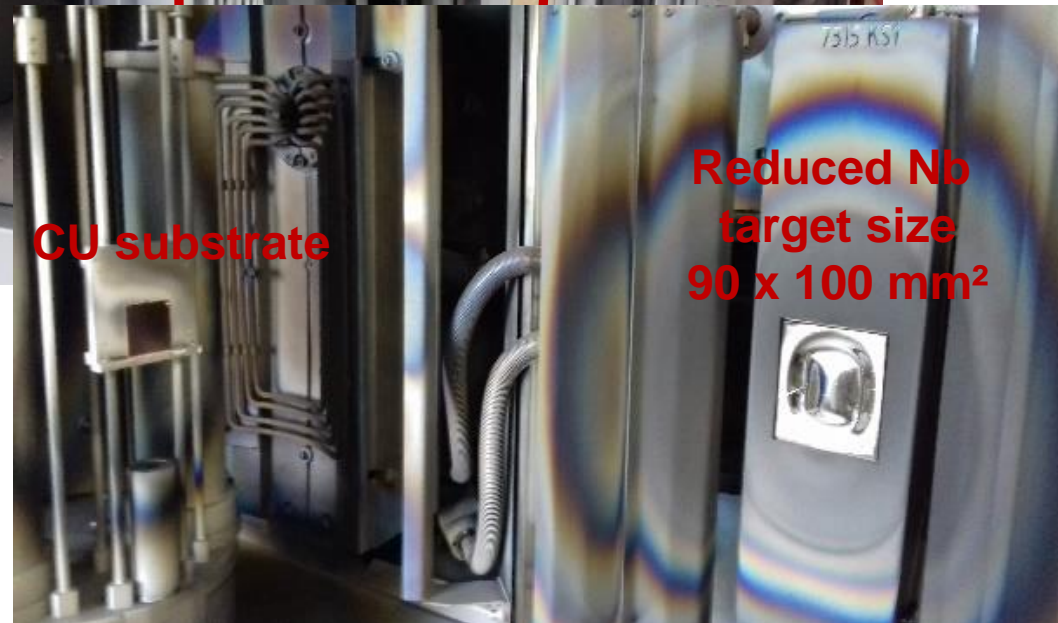
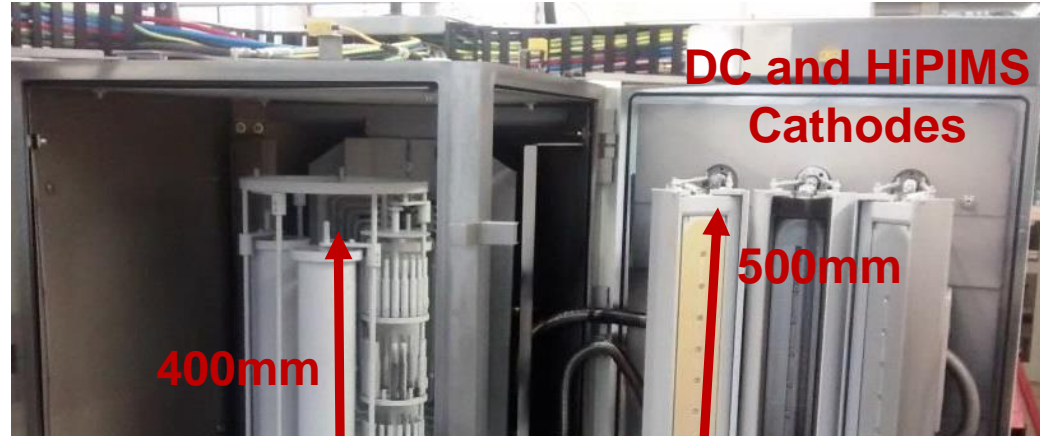
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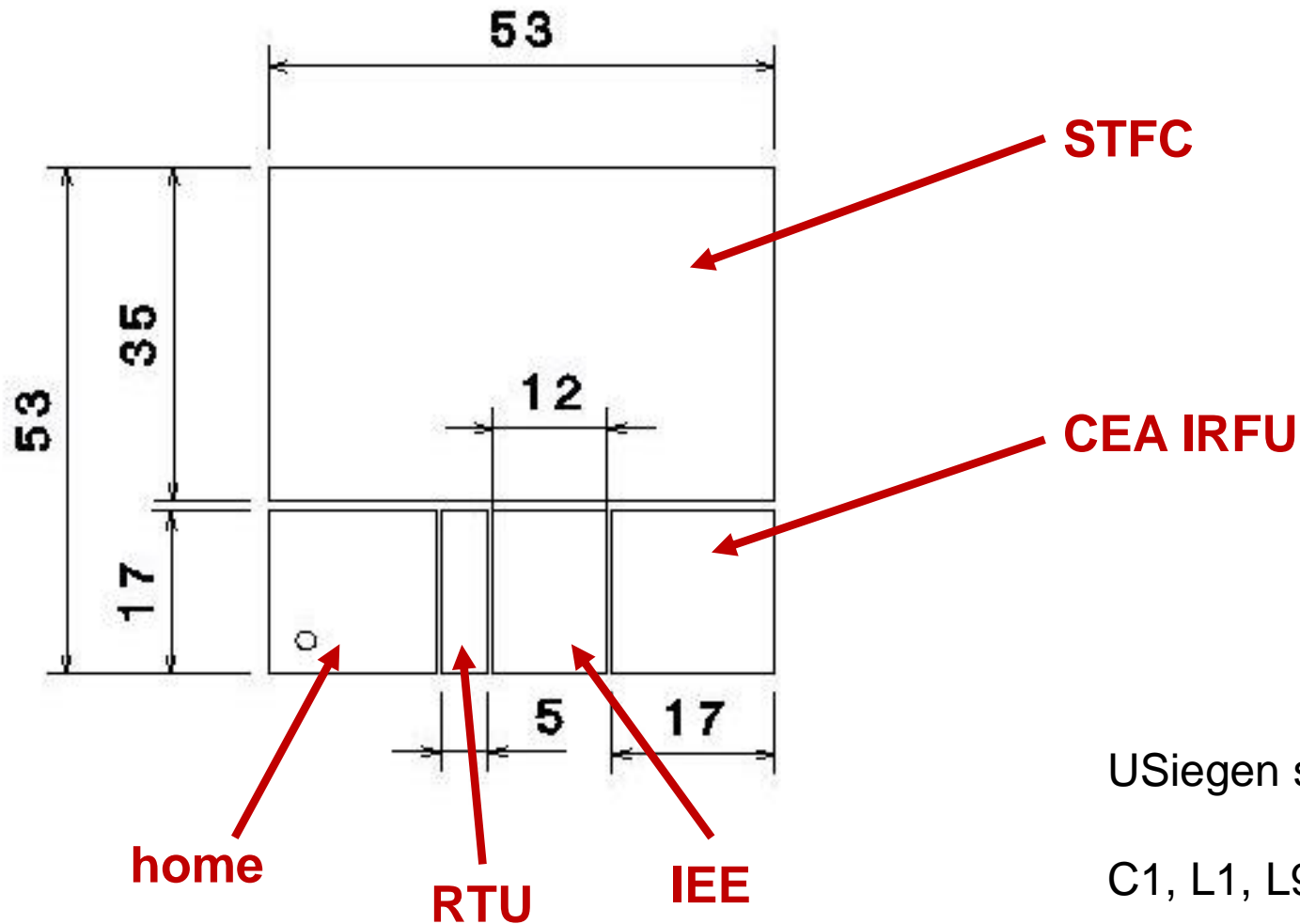
## ARIES sample process parameter

Parameter	value
Power	400 W
Temperature	650 °C
Substrate bias	0V
Ar pressure	$1.5 \times 10^{-2}$ hPa
Target – substrate distance	6 cm
Base pressure @ 650 °C	$1.22 \times 10^{-5}$ hPa
Deposition time	20 min
→ Film thickness	3 μm

# DCMS and HiPIMS at industry standard



# ARIES sample cut and shipping



USiegen sent:

C1, L1, L9, L10, and L23

## ARIES sample characterization

AFM – Surface morphology and roughness (can be included into the final report)

SEM – Surface and crosssectional investigation\*

EDX – Elemental analysis\*

\* only parts can be included into the final report (30. May 2018)



Thank you for your attention!