

# Photo emission microscope PHEMOS-1000 ONPY-PEM

Extended resources for Failure Analysis (FA) in ONPY

## Subject:

*This document outlines analytical possibilities of the front and backside photoemission microscope PHEMOS-1000 in OPNY2*

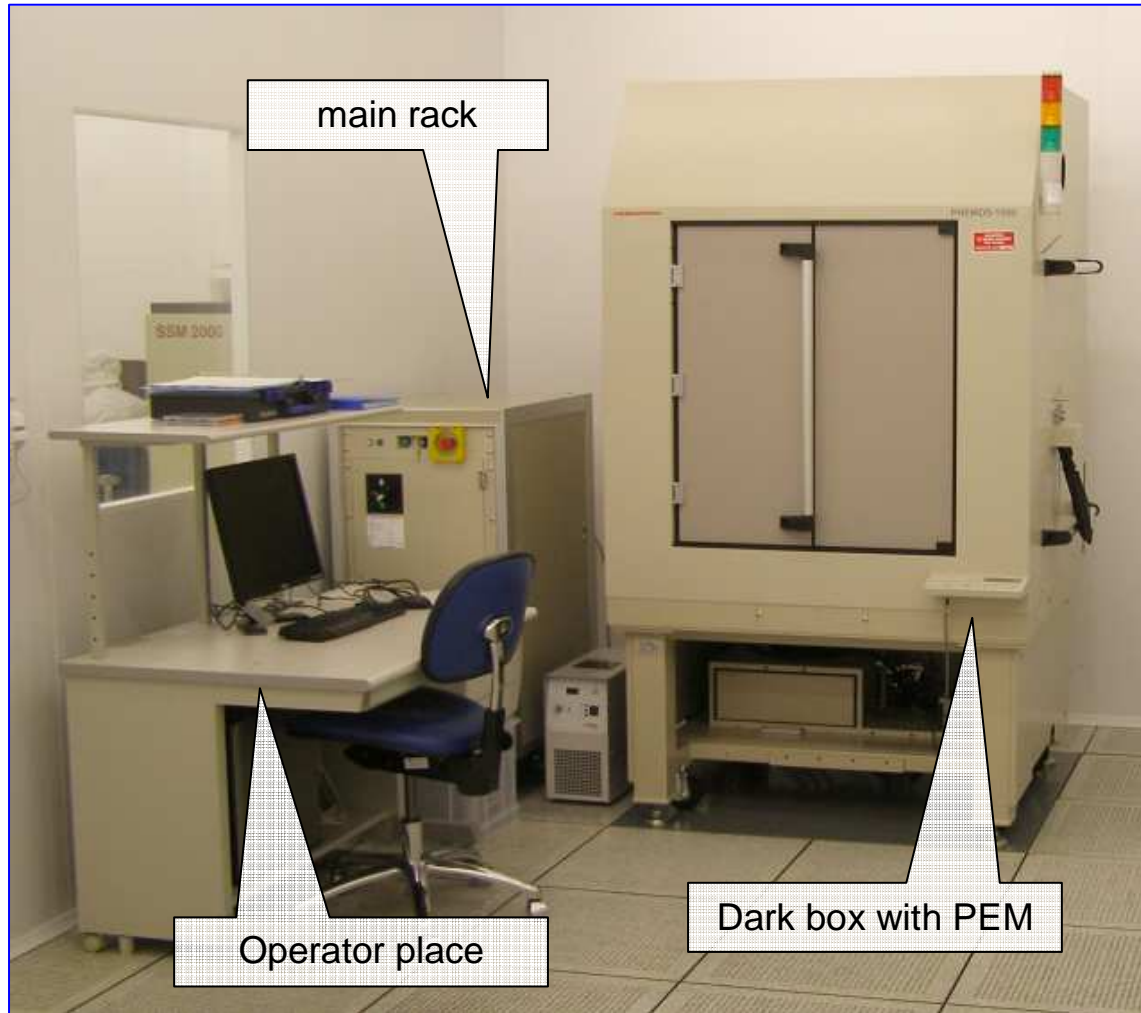
## Content:

This system was purchased from Hamamatsu Japan and installed in WW11

## Reference documents

N/A

## Photoemission Microscope PHEMOS-1000 *(outline)*



### **General:**

Dual stand photoemission microscope with optional Laser scanning

### **Optical system:**

PEM: cooled CCD camera Hamamtsu (1024x1024, pettier cooled, NIR range appropriate for front and backside photoemission)

### **Presented Objectives:**

- 0.8x Macro objective
- 5x (Aperture=0.14, WD ~ 35 mm)
- 20x (Aperture=0.40)
- 100x NIR \* (0.50, WD ~ 12 mm)

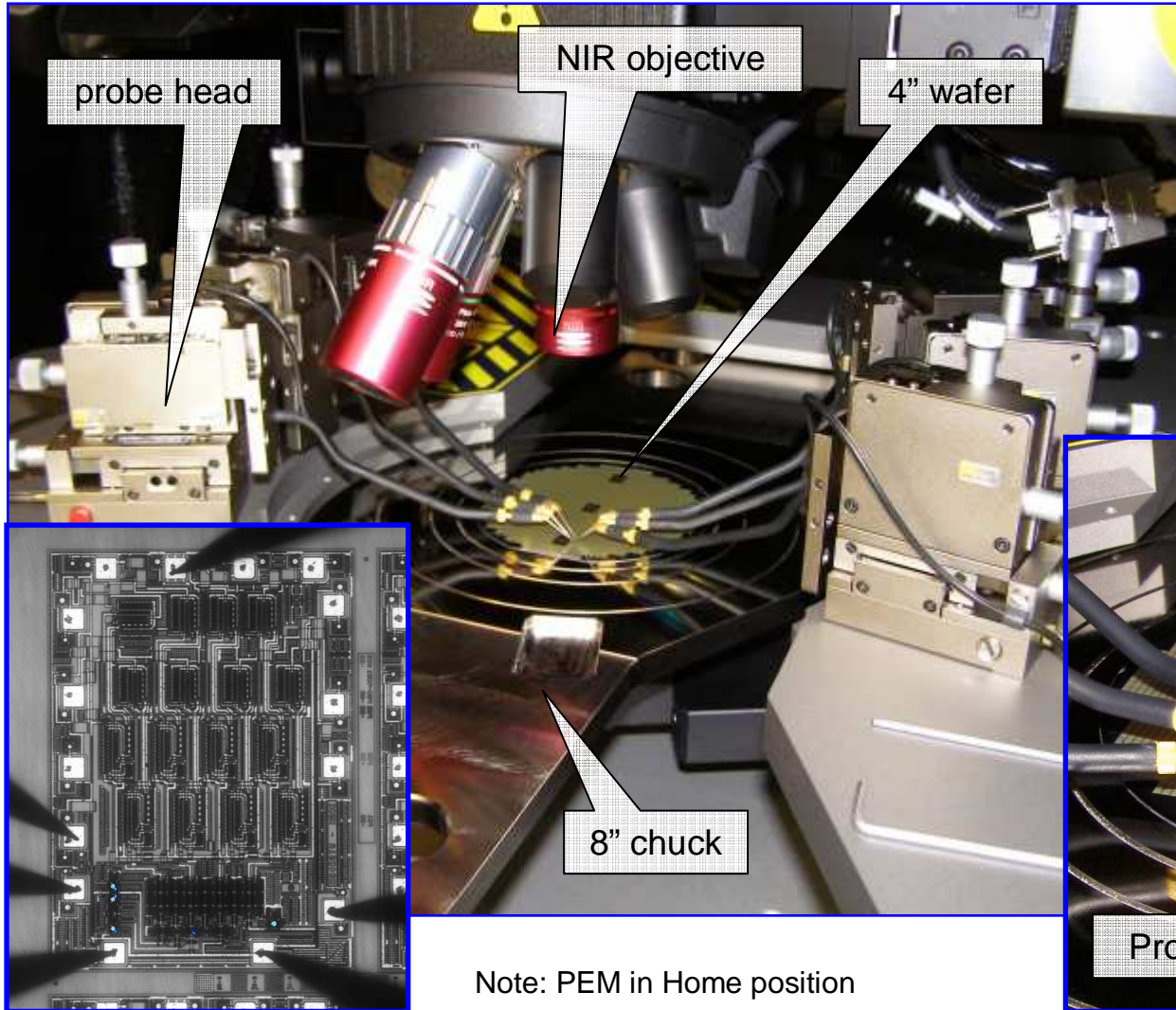
### **Prober Karl Suss PM8**

- Manual prober for 4-8" chucks
- dual plate (front and backside probing)
- Theta adjustment
- 4 x PH120 probe head
- 2 x PH150 precise probe head
- backside CCD camera (with 0.8x, 1,5x, 3x magnification)
- microprobe opportunity

### **Current Instrumentation:**

- R&S power supply 2 x 35 V / 1 A
- R&S power supply 1 x 35 V / 10 A
- HP power supply 2 x 25 V / 1A, 6 V

# Front side probing and photoemission with PHEMOS-1000



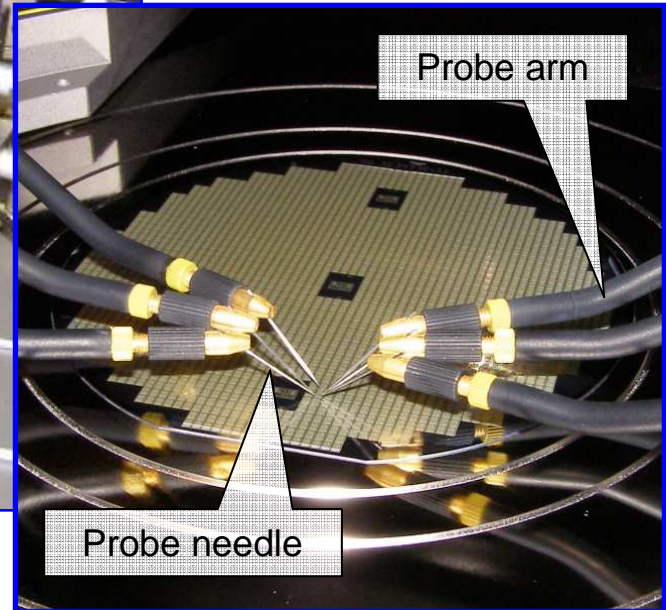
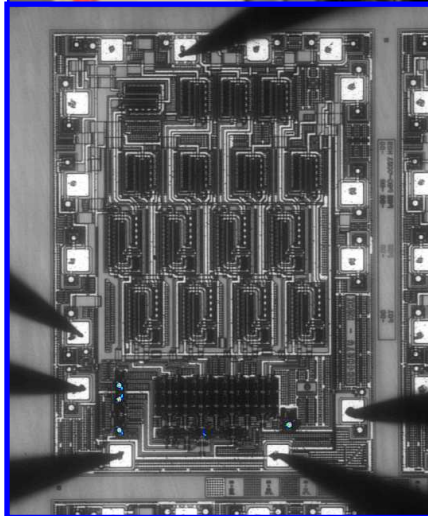
### Electrical specification:

up to 6 probe heads:  
4 x Karl Suss 120 (pad probing)  
2 x Karl Suss 150 (micro probing)

**Maximum wafer size: 8"**

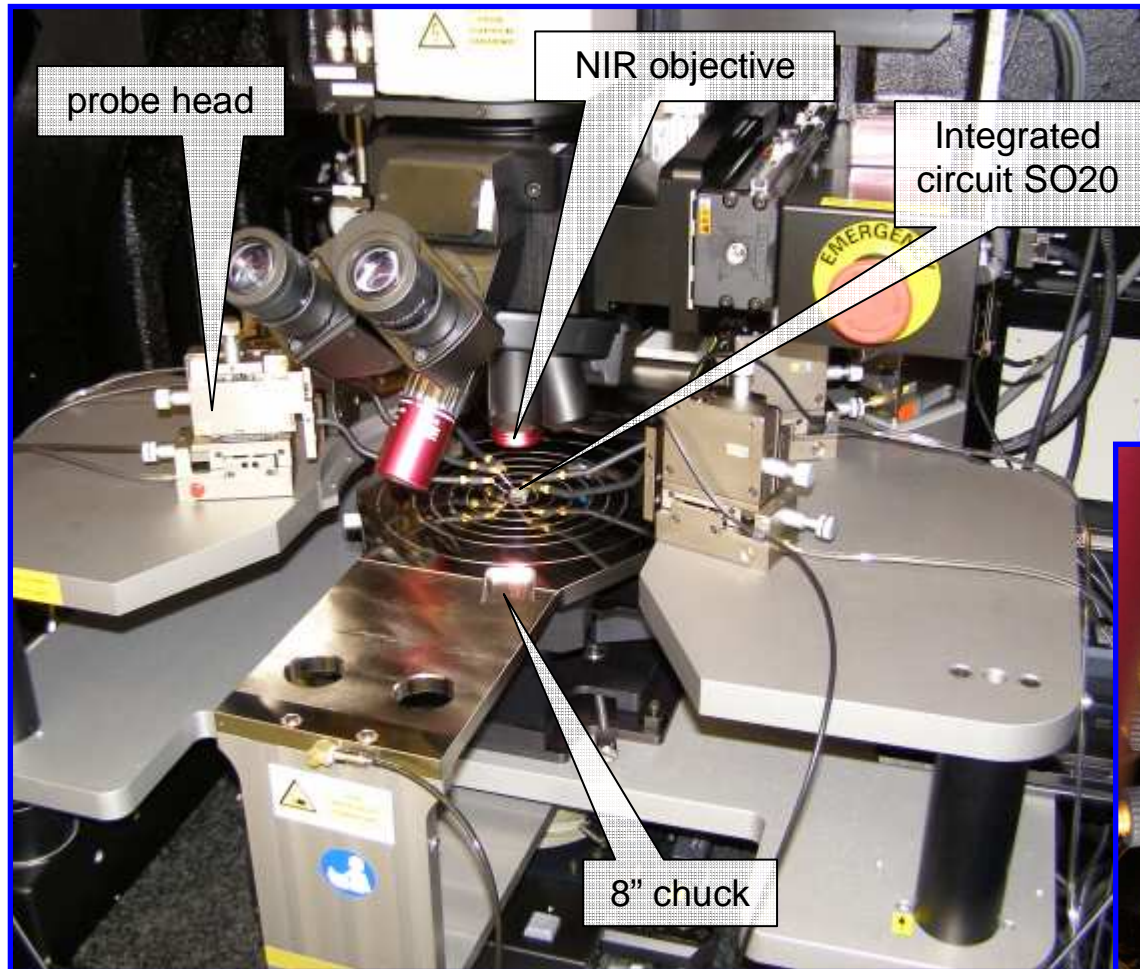
### Current Instrumentation:

R&S power supply 2 x 35 V / 1 A  
R&S power supply 1 x 35 V / 10 A  
HP power supply 2 x 25 V / 1A, 6 V  
DTS 1 tester planned





## IC Front side probing and photoemission with PHEMOS-1000



### Electrical specification:

up to 6 probe heads:

4 x Karl Suss 120 (pad probing)

2 x Karl Suss 150 (micro probing)

**Maximum wafer size: 8"**

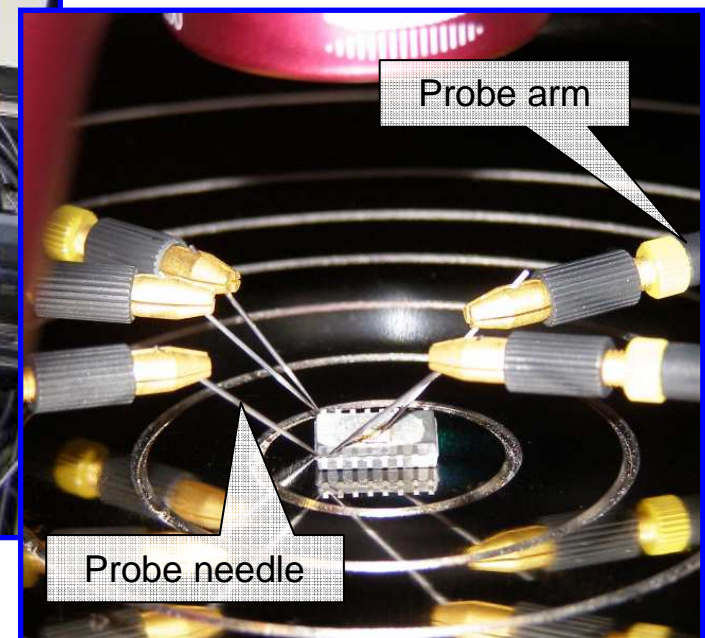
### Current Instrumentation:

R&S power supply 2 x 35 V / 1 A

R&S power supply 1 x 35 V / 10 A

HP power supply 2 x 25 V / 1A, 6 V

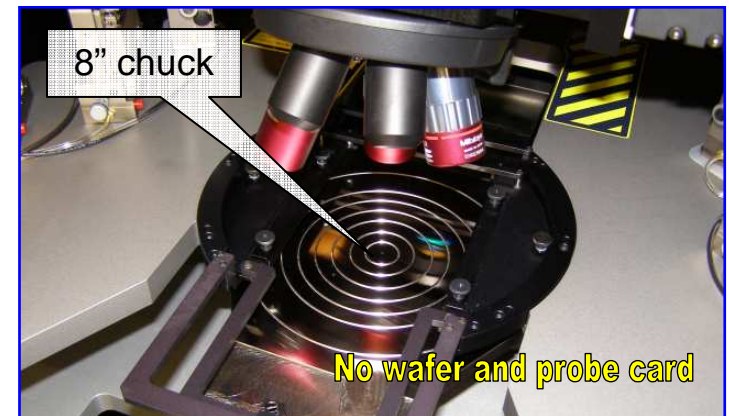
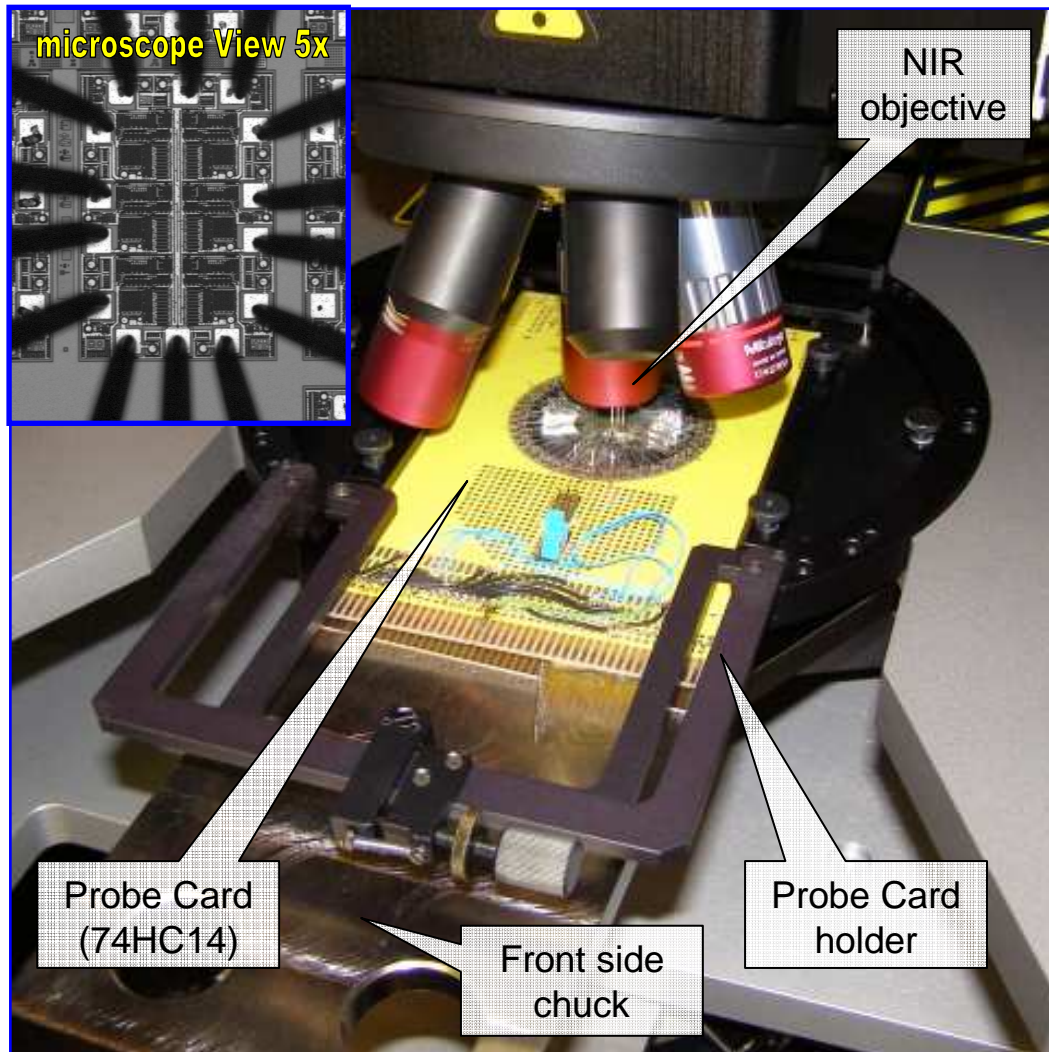
DTS 1 tester planned



Note: SO20 IC fixed by vacuum



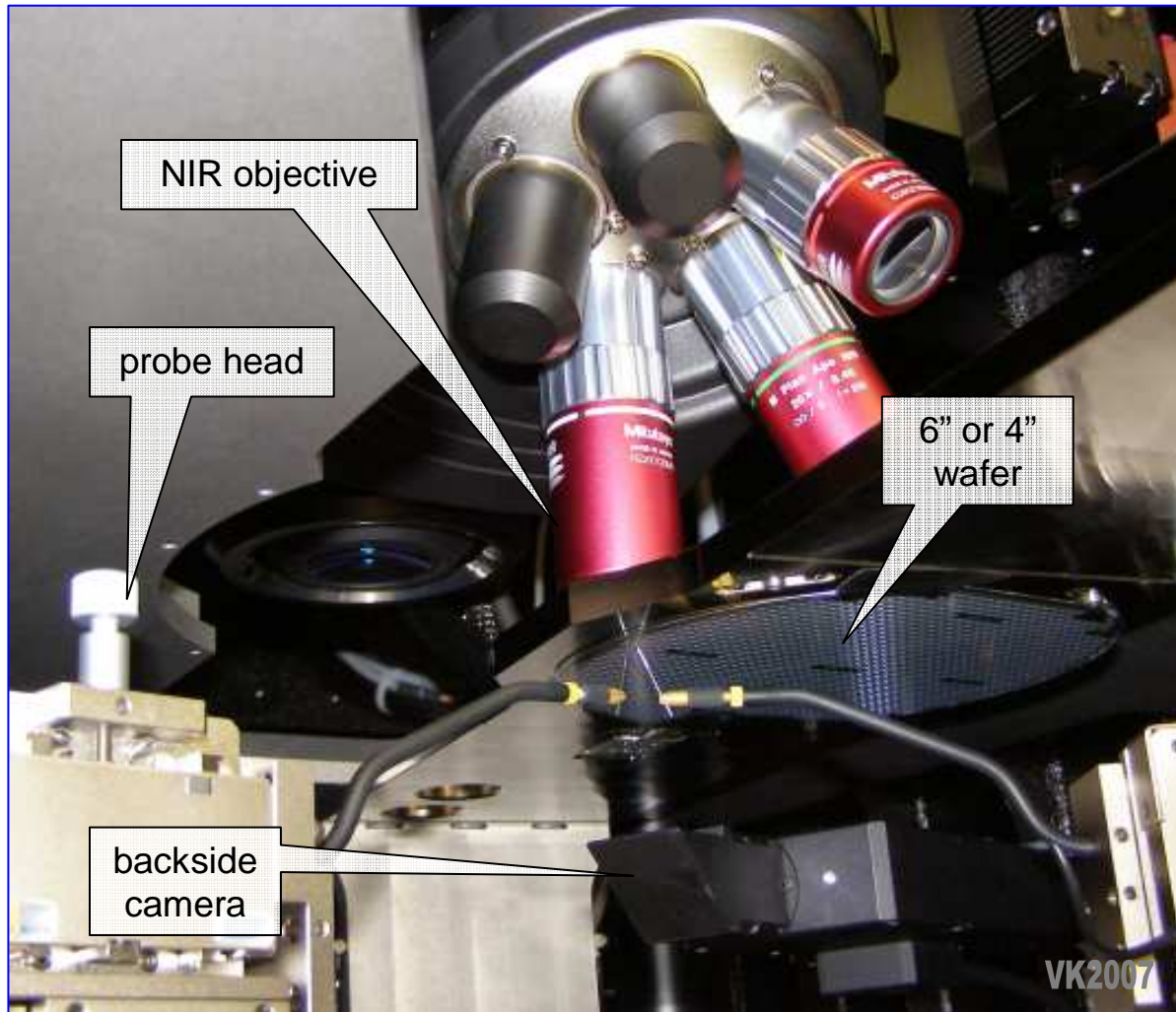
## Front side Photoemission with using of Probe Card



- Maximum wafer size: 8" (200 mm)
- Probe Card format: Electroglas compatible
- Electrical Connection: DC source and DTS tester (planned)



## Back side probing and photoemission with PHEMOS-1000



### Electrical specification:

up to 6 probe heads:

4 x Karl Suss 120 (pad probing)

2 x Karl Suss 150 (micro probing)

### Chucks available in ONPY:

4 inch back side

6 inch back side

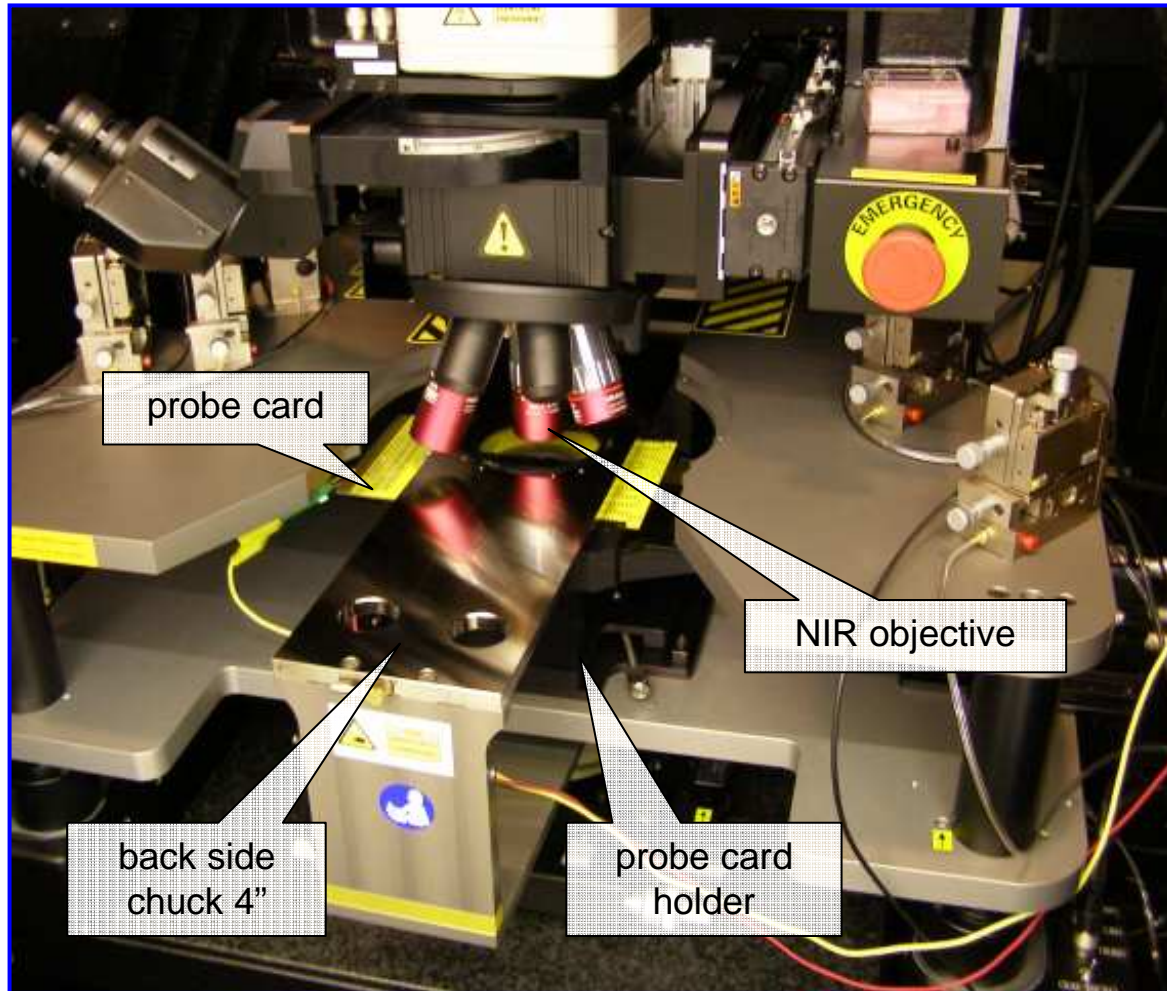


### Sample - requirements:

100-200 um thickness of the sample  
(thinner better)



## Back side Photoemission with using of Probe Card



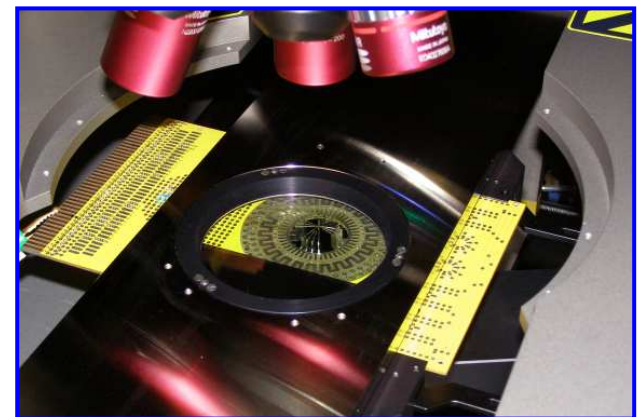
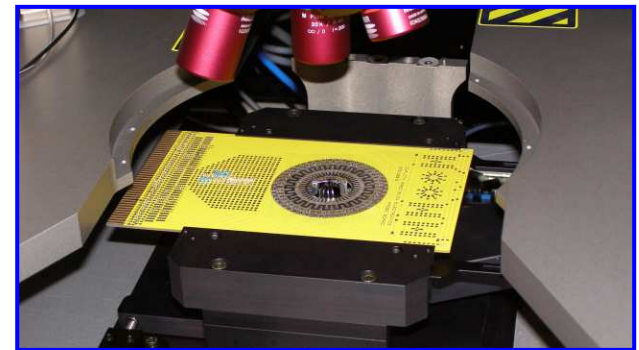
Probe Card format: Electroglas compatible

### Electrical Connection:

- DC source
- DTS tester (planned)

### Chucks available in ONPY:

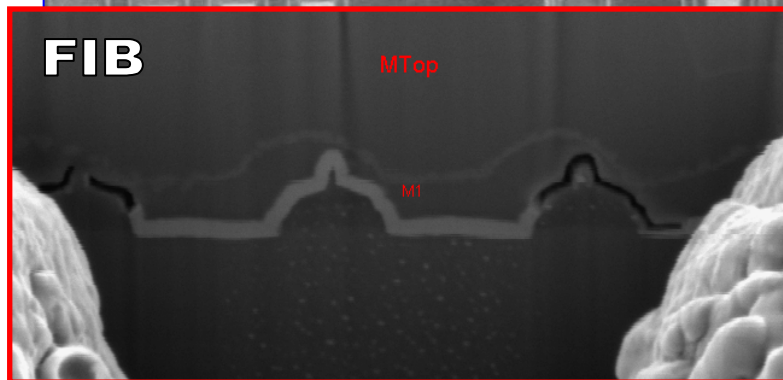
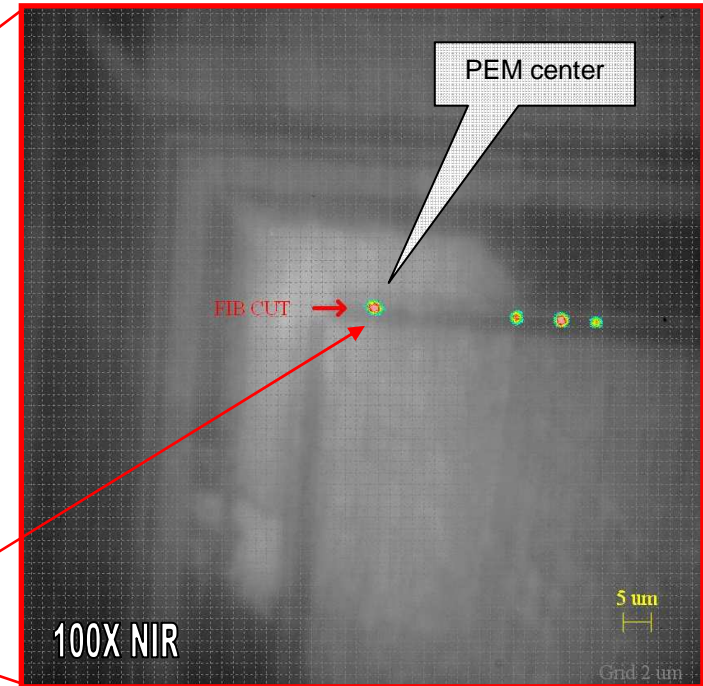
- 4 inch back side
- 6 inch back side



### Sample - requirements:

100-200 um thickness of the sample (thinner better)

## First experiment performed on PHEMOS-1000 in ONPY2 (Back side)



### **Background:**

Part: PS5LV NCP5381 (AN86)  
Technology: PowerSense 5LV

Units at the edge of the wafers were failing because of increased leakage of protective ESD diodes. By help of new installed photoemission microscope photoemission centers were localized and FIB cut was performed. The root cause was found and qualified as missing TiW barrier between AlCu and Si (Metal1).



## PHAMOS-1000 in ONPY2 list of operators

Following operators were trained to work with this tool by vendor:

Mojmir Pripko (Device Engineer)  
Juraj Bobula (Device Engineer)  
Juraj Solar (Defectivity Engineer)

Responsible engineer:

Valentin Kulikov

