

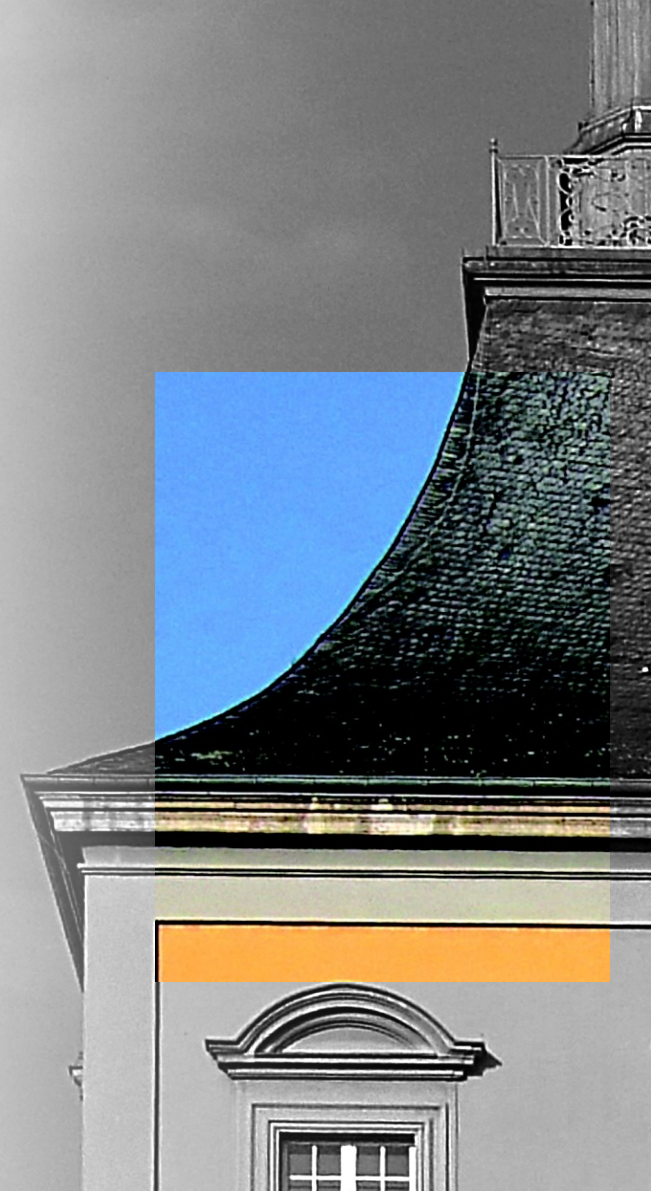


Focused Ion Beam investiations

Cleanroom User Meeting
15.06.2026

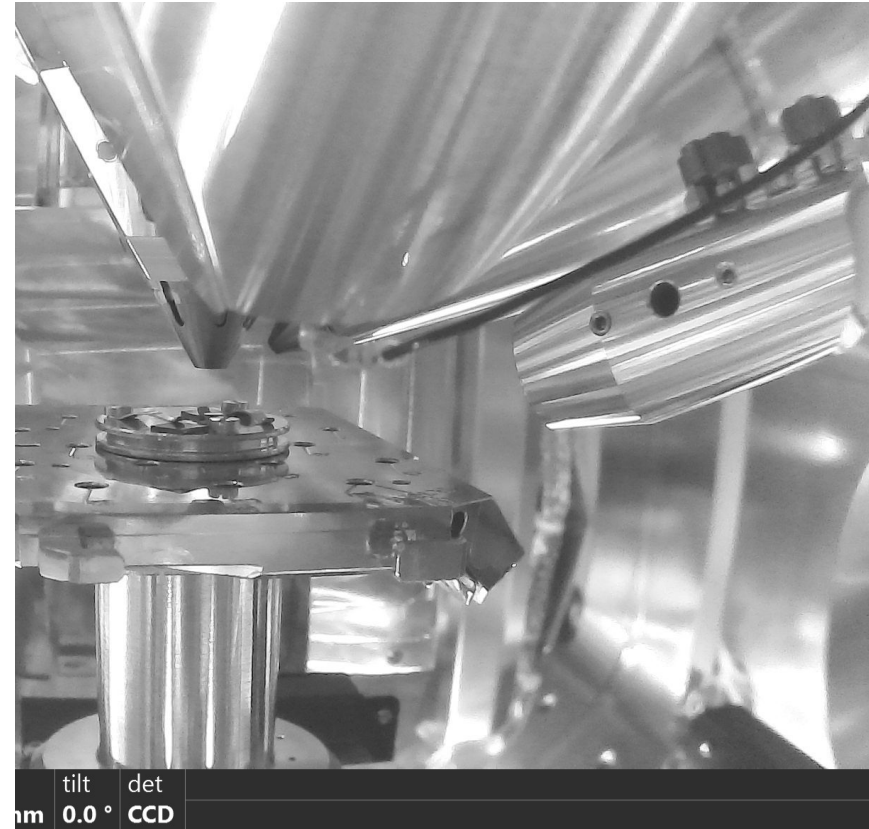
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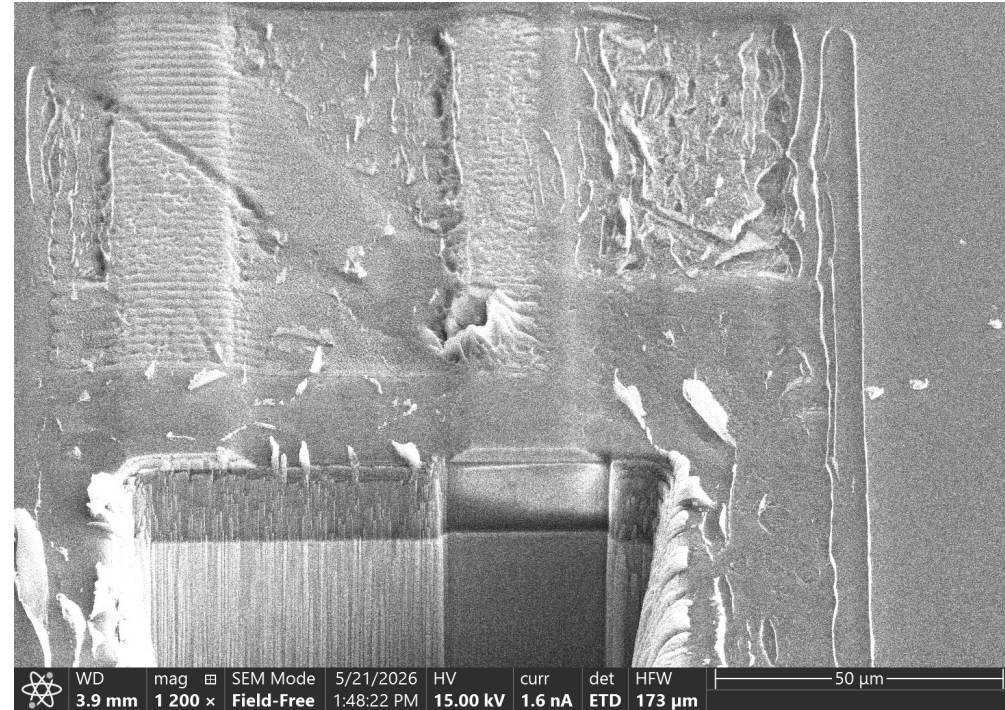
Motivation

- Cleanroom work ongoing for quite a while
- Process development started and first samples produced
- Collection of samples gets larger and larger
- But we don't know how well our processes are
- No/limited information on layer stackup, trace shape, etc.
- Need inspection process to characterize cleanroom work
- Offer from Siegen to use their FIB and investigate some samples



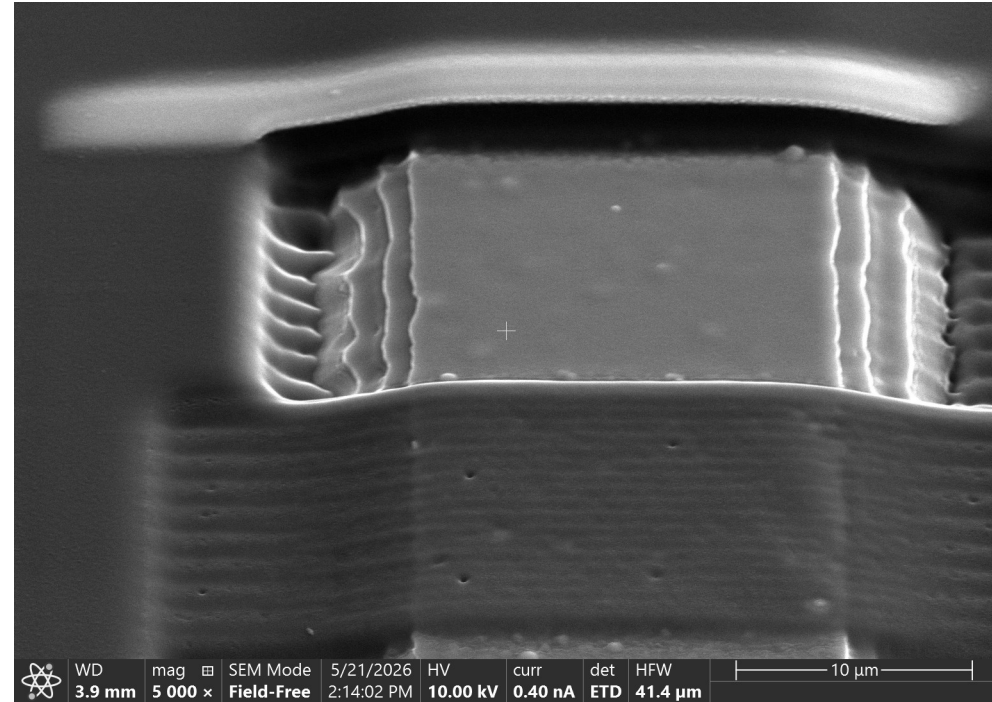
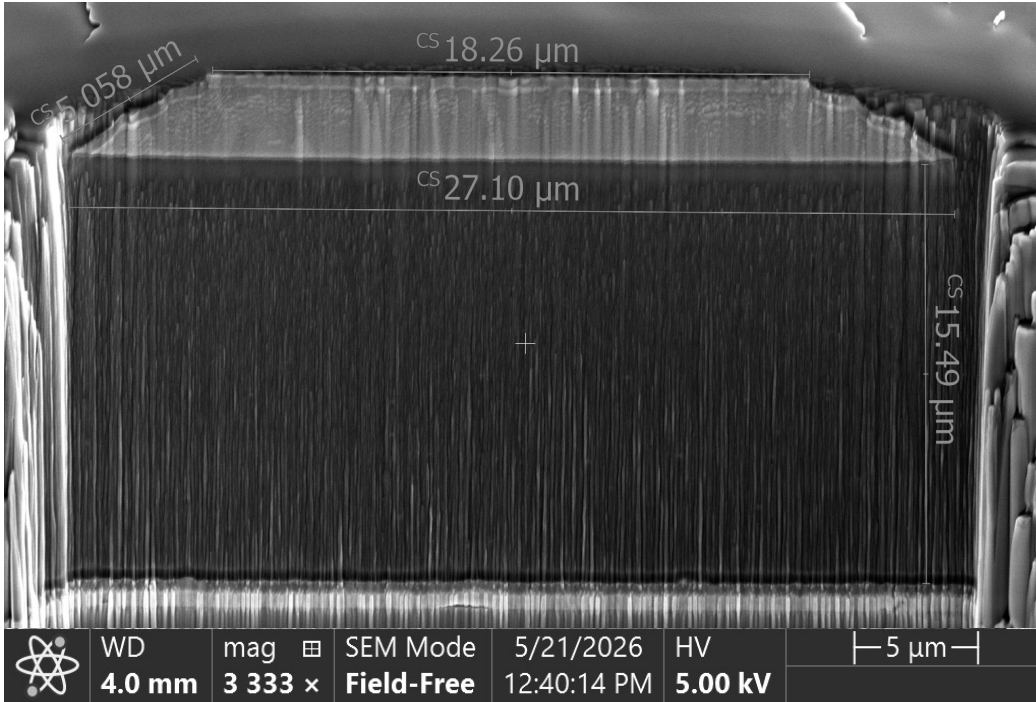
Samples

- Self made samples with 3um aluminum traces
 - Trace dimensions
 - Via structures
 - Polyimide layer thickness
- IZM structures with 3-4um copper traces
 - Focus on vias
 - (trace dimensions not possible due to time limitations)
 - Copper layer buildup
- Isolation layer samples (Daniel/Jaffar)



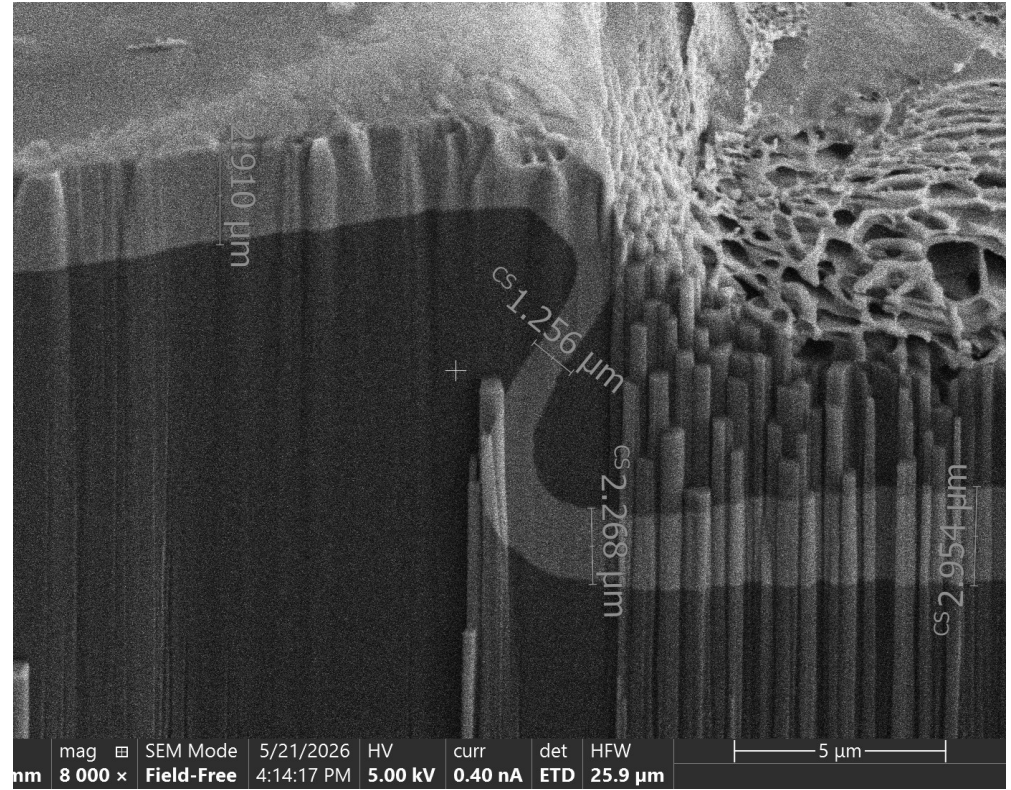
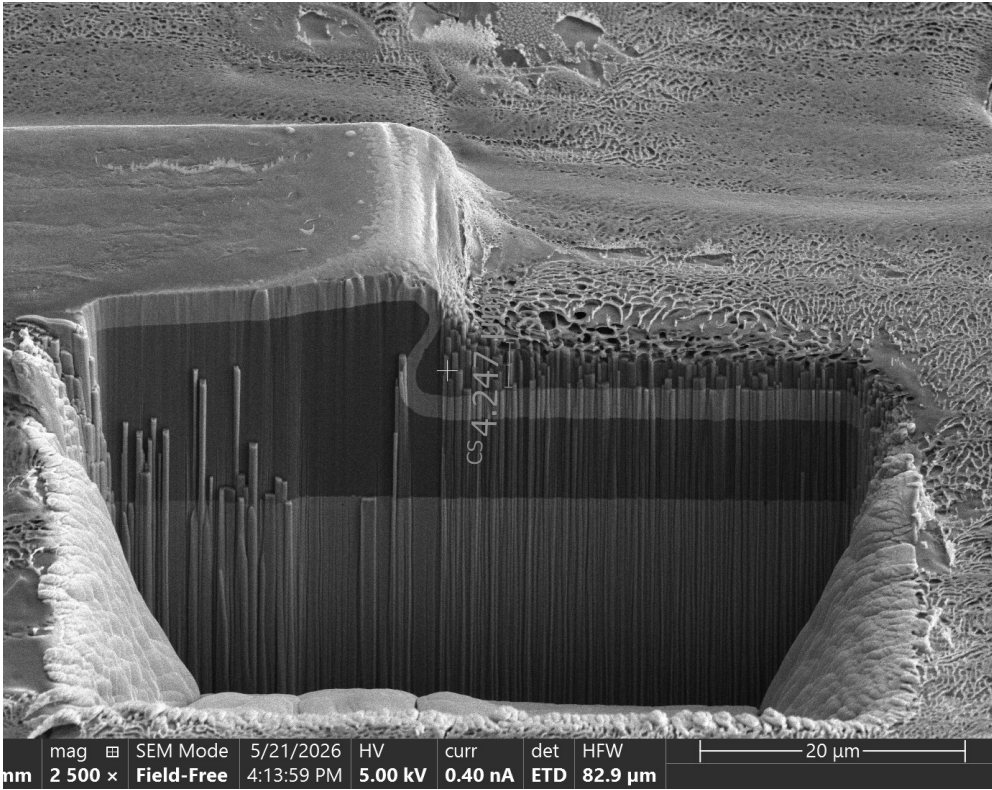
Self made sample

- Self made samples with 3um aluminum traces



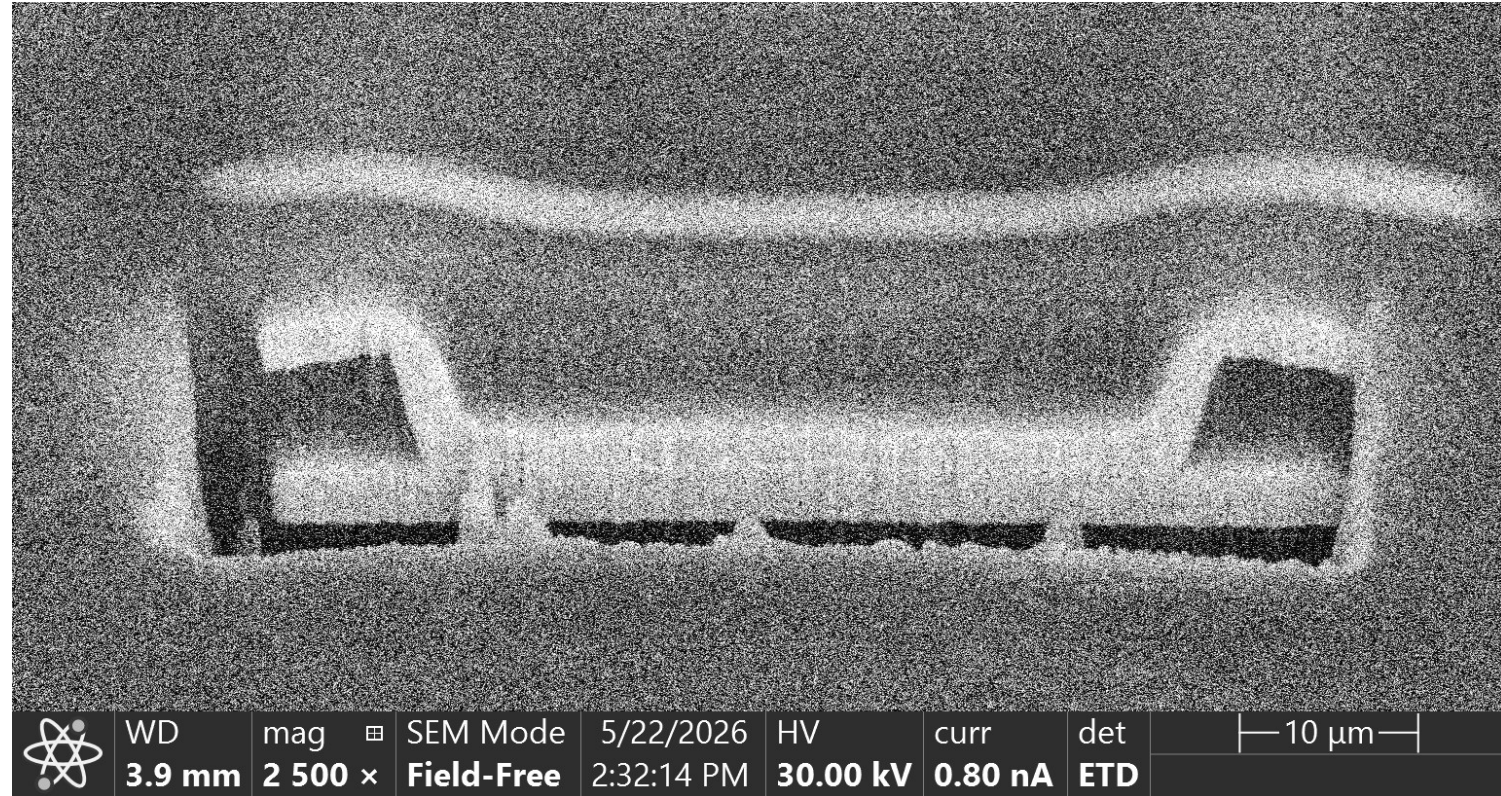
Self made sample

- Self made samples: first step towards vias



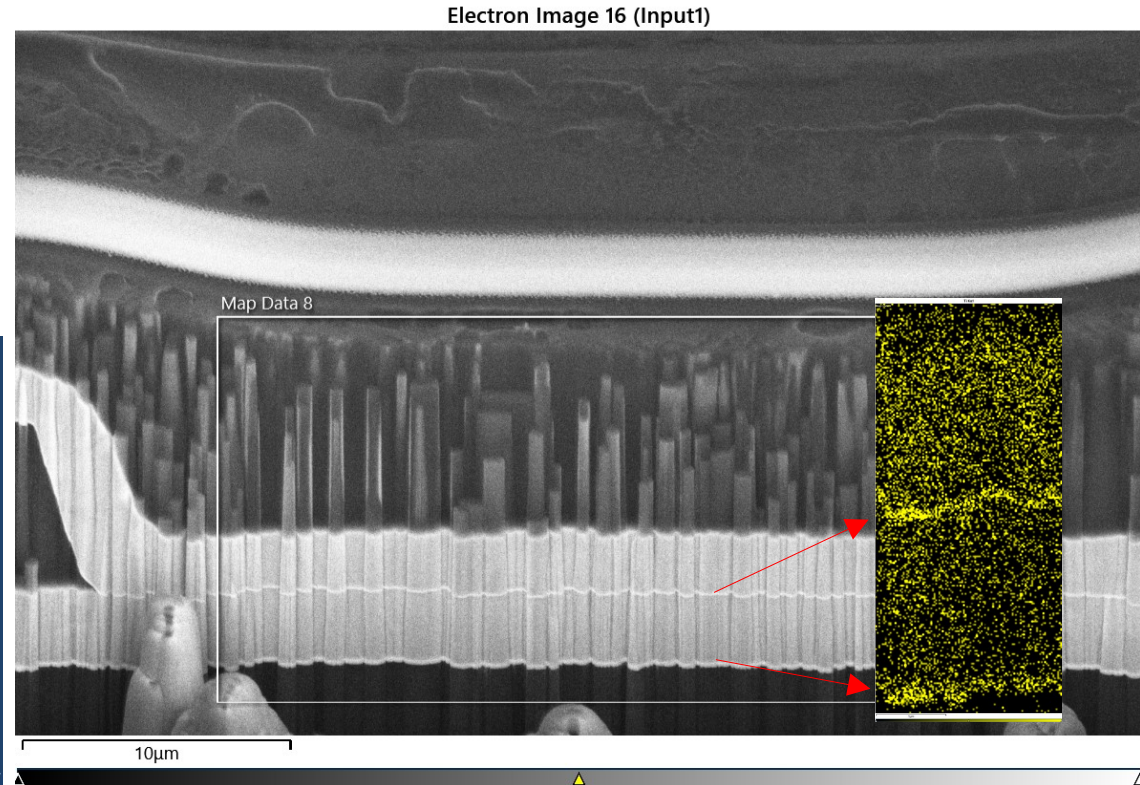
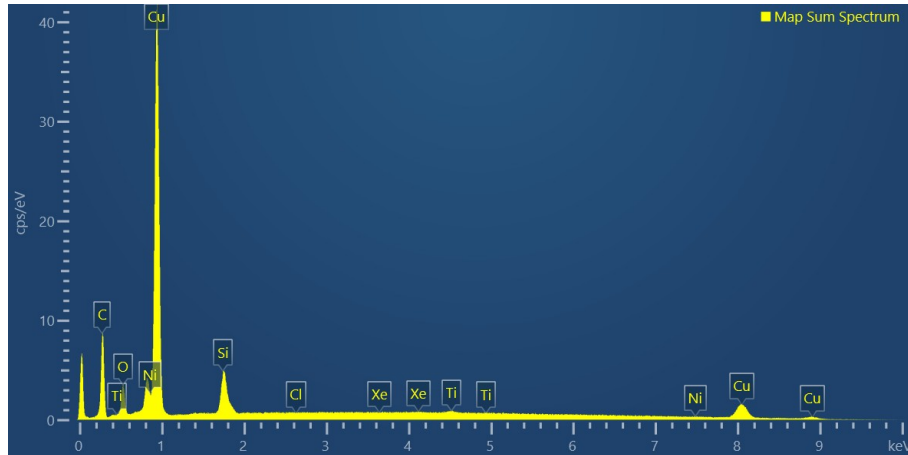
IZM sample

- Very noisy picture due to issues with SEM
- Structure of via nicely visible



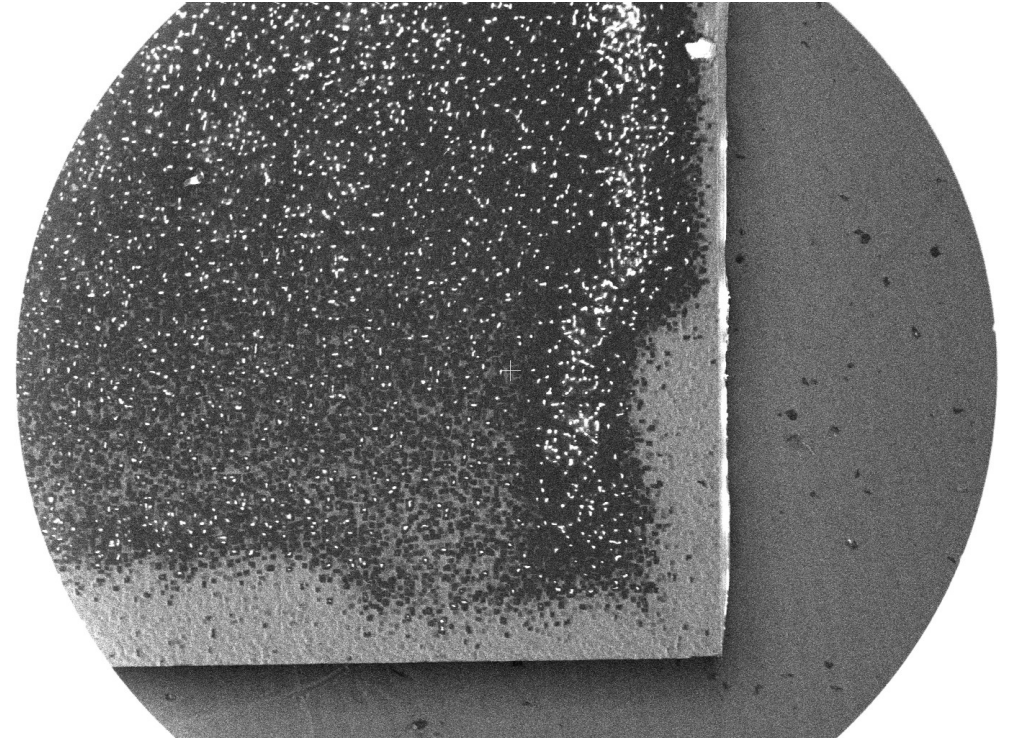
IZM sample

- Material analysis reveals details of copper metalization process:
- ~200nm Titanium as seed layer



Jafars Sample

- Due to surface charging, non conductive samples are not easy to image. Jafars Samples were covered in PI → very hard, not much information SEM
- Also area of interest quite large high resolution of SEM not quite necessary
- The structures show very few or no PI on the edges. His process needs a lot of refining.



	WD 4.0 mm	mag  74 ×	SEM Mode Field-Free	5/22/2026 3:24:20 PM	HV 10.00 kV	curr 0.80 nA	det ETD	HFWD 2.80 mm	 500 μm
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Next Steps

- Need to investigate more samples
- Prepare new samples
- Get introduction to FIB and FIB booking system
- In the long run think about contacting Caesar for their FIB (much shorter travel)
- Think about buying used FIB from Siegen (50k€)
- Think about buying Ion Milling machine and investigate mechanical cross sectioning options in Bonn

