UNIVERSITÄT BONN SI LAB Silizium Labor Bonn FTD

Focused Ion Beam investiagtions

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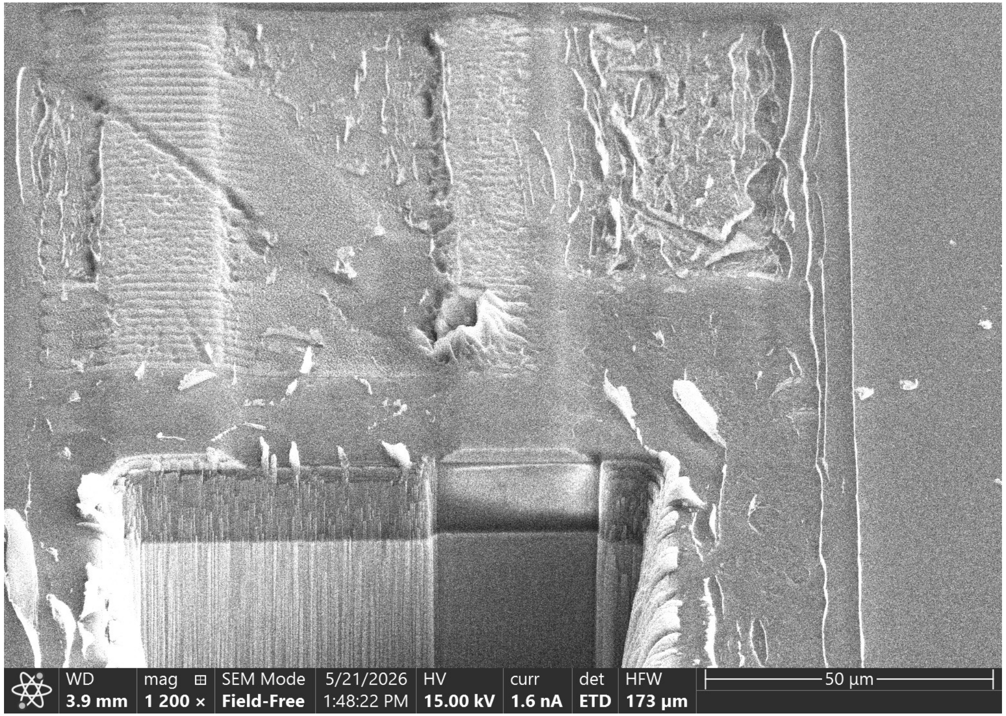
Motivation

- 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

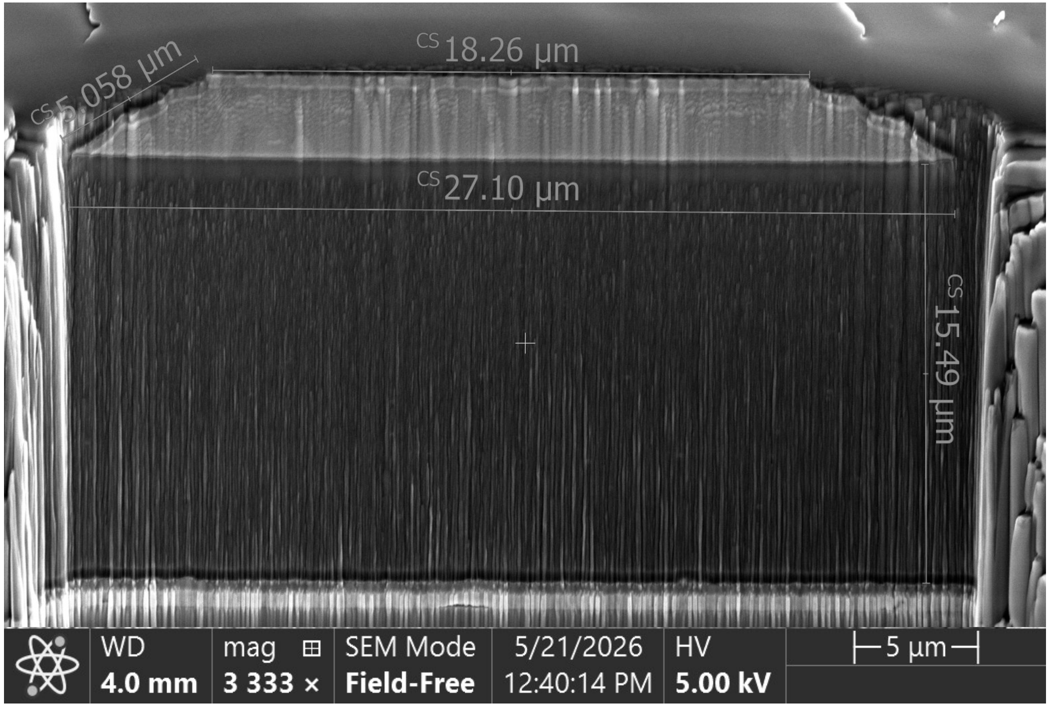
Samples

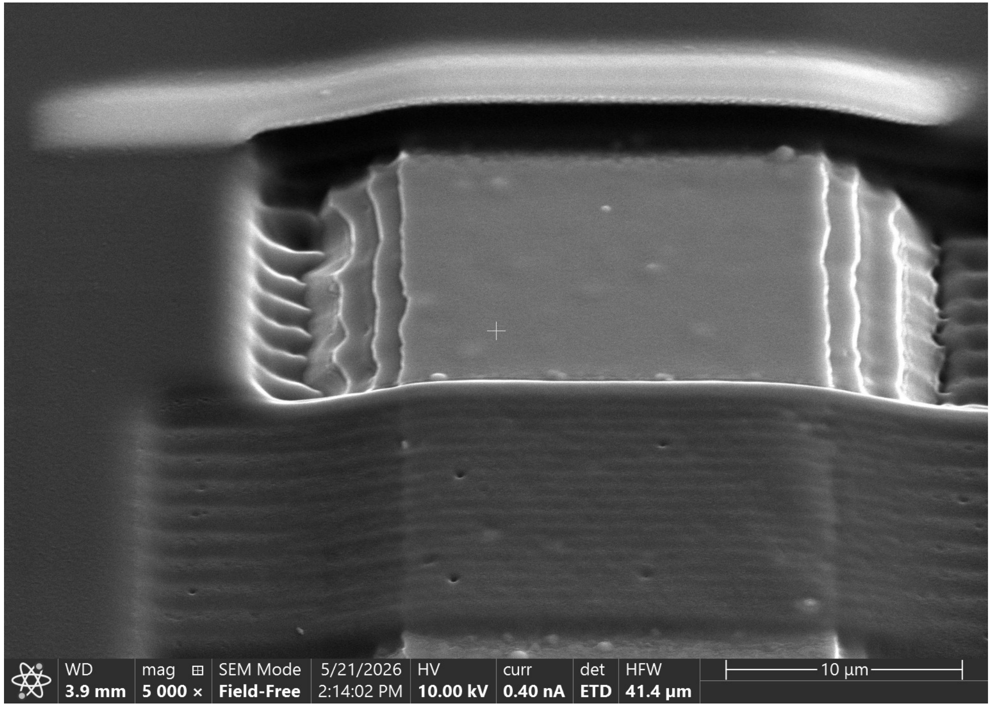
- Self made samples with 3um aluminum traces
  - Trace dimensions
  - Via structures
  - Polyimide layer thickness
- IZM structures with 3-4um copper traces
  - Focus on vias
  - (trace dimensions not possible due to time limitations)
  - Copper layer buildup
- Isolation layer samples (Daniel/Jaffar)



Self made sample

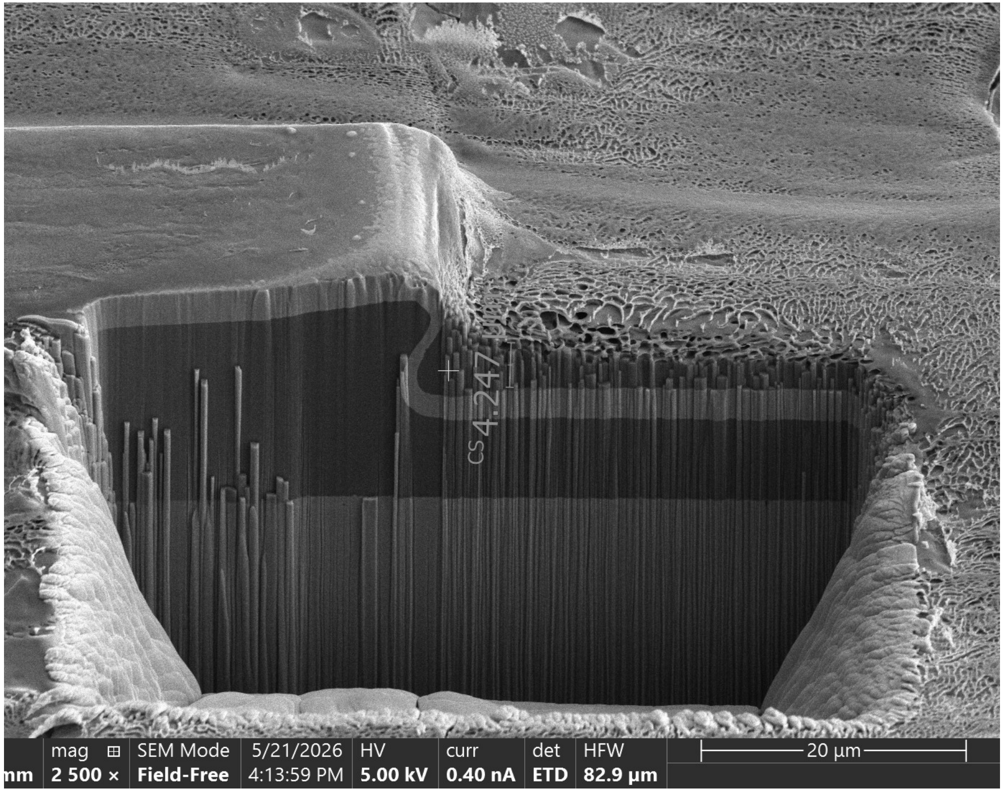
- Self made samples with 3um aluminum traces

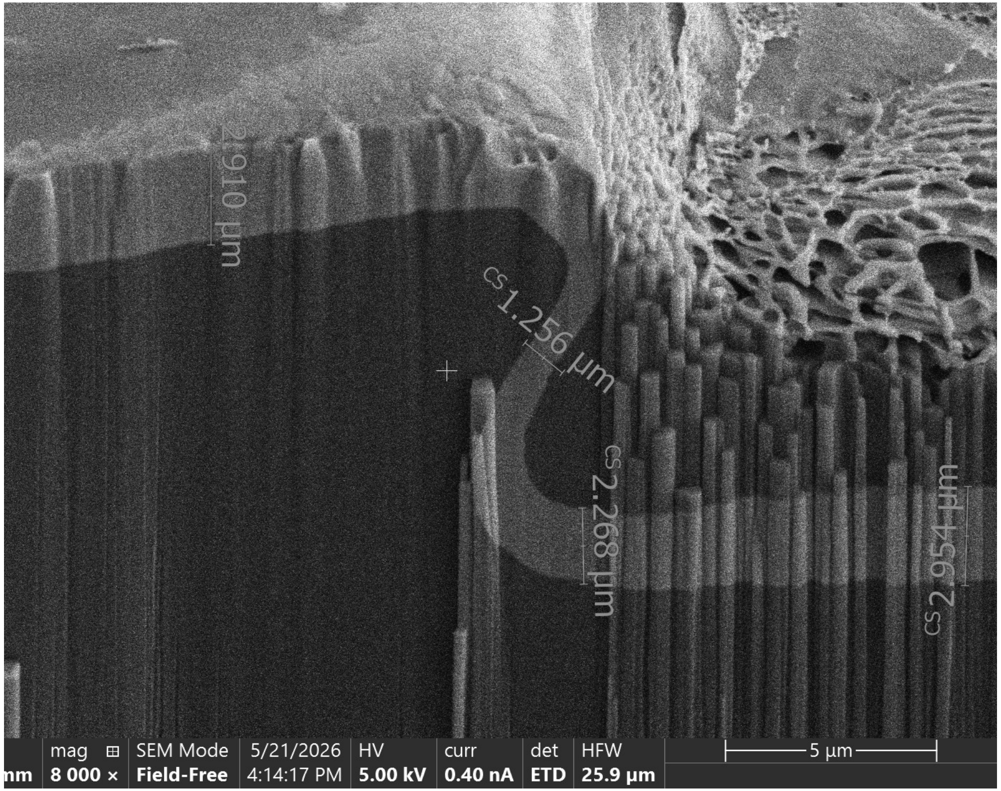




Self made sample

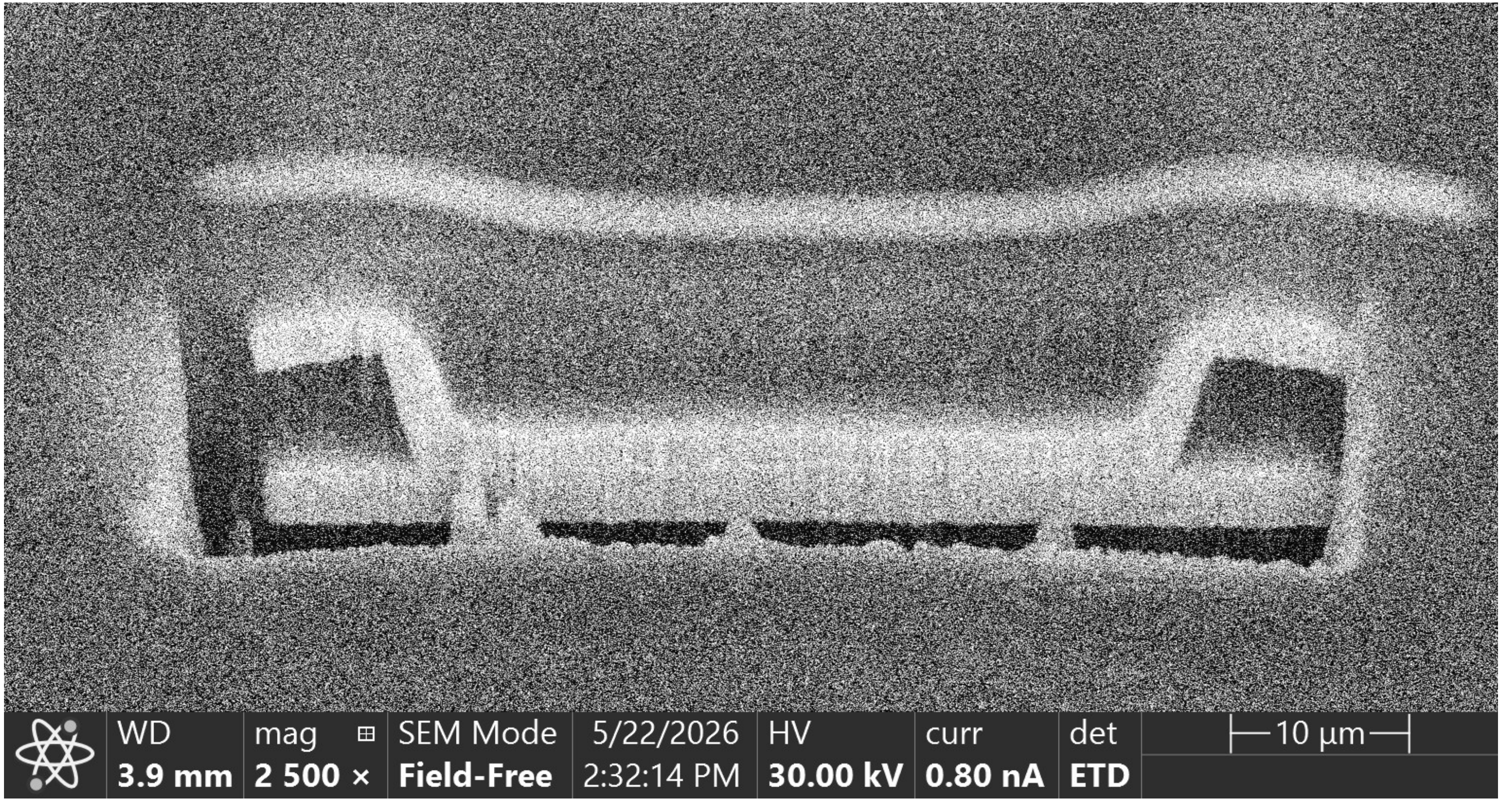
- Self made samples: first step towards vias





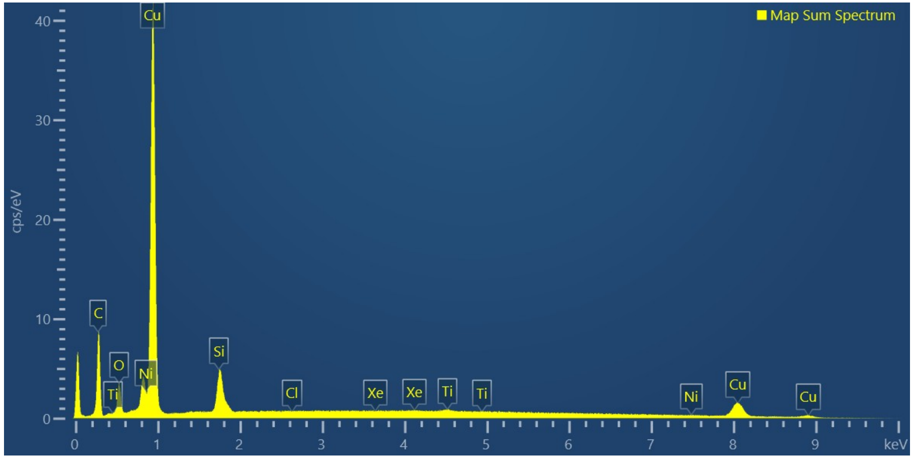
IZM sample

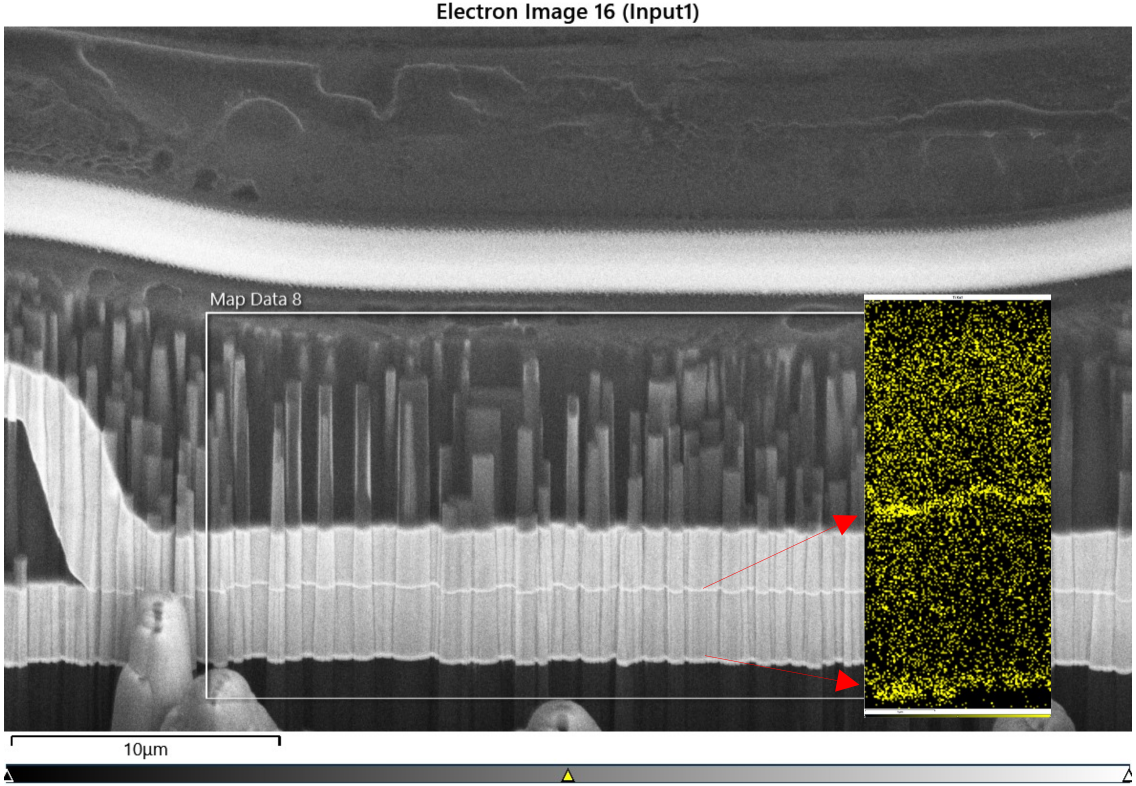
- Very noisy picture due to issues with SEM
- Structure of via nicely visible



IZM sample

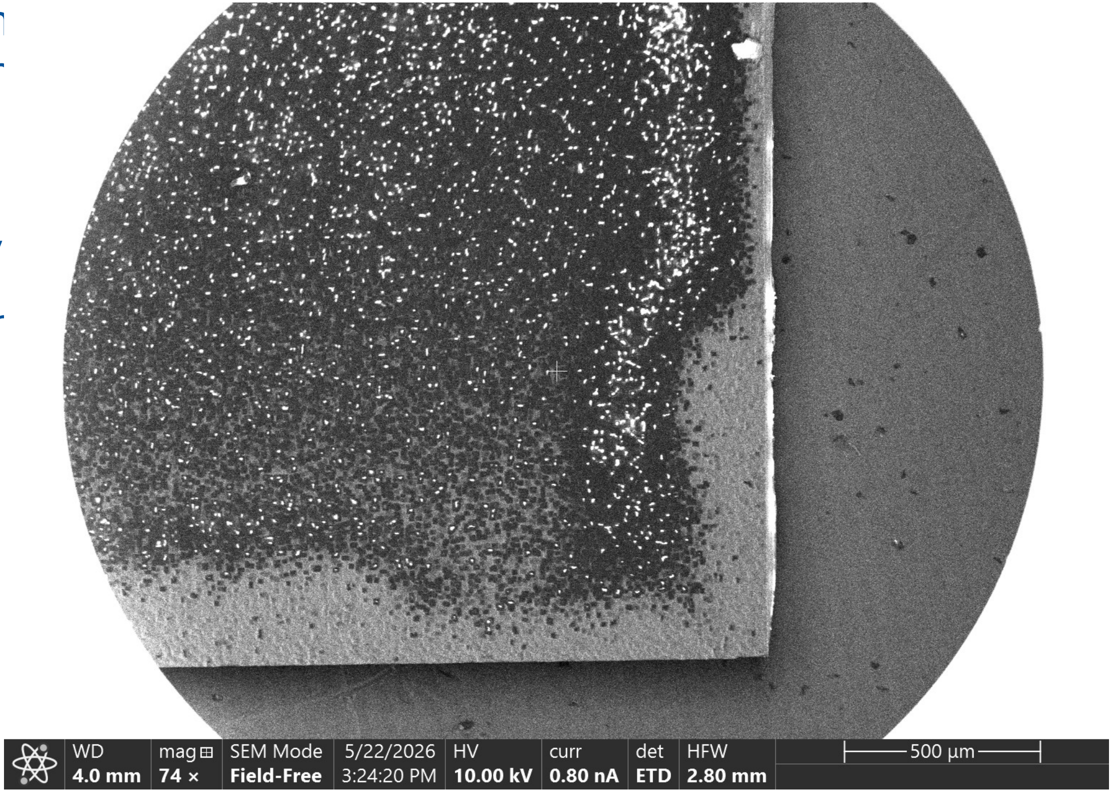
- Material analysis reveals details of copper metalization process:
- ~200nm Titanium as seed layer





Jafars Sample

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



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


This is Herbert