Fast images of FIB x-sections using a CFESEM with BSE-TTL-detection

all samples uncoated and unetched

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Fast images of FIB x-sections using a CFESEM with BSE-TTL-detection

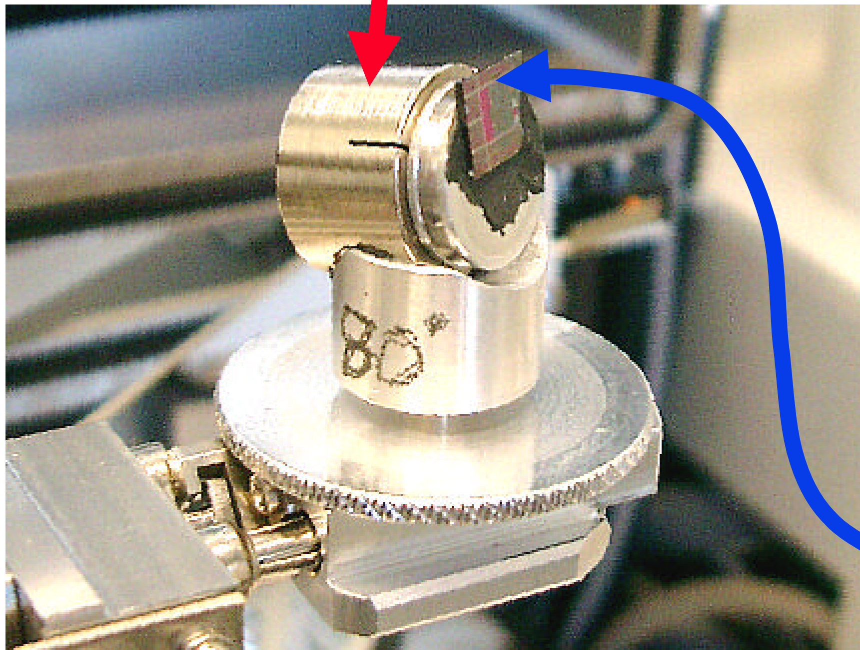
Hitachi S-4800

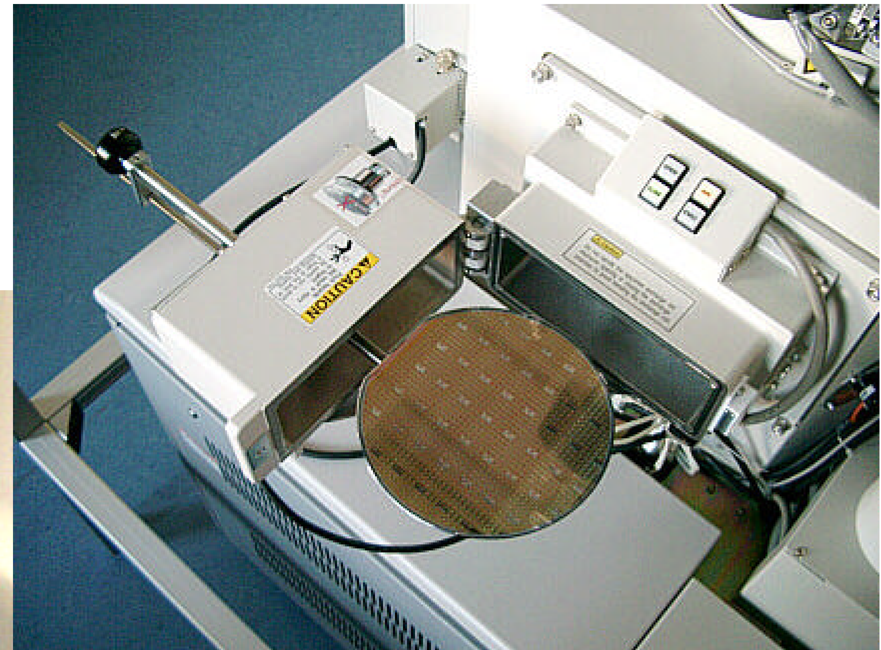
- Equipment
- Specimen mounting
- 1th x-section
  metal lines and steel particle
  (optical microscopy)
- 2nd x-section
  capacitor edge, dielectric defect
  (emission microscopy)

Schlumberger P2X

specimen exchange chamber and specimen mounting

15 mm stubs (3mm pin)
easy specimen exchange
with 70°, 75 or 80° tilted
sample holder adapter





FESEM with fast specimen exchange procedure

FIB x-section position near to the specimen edge for low SEM working distances

specimen mounting with conductive carbon cement

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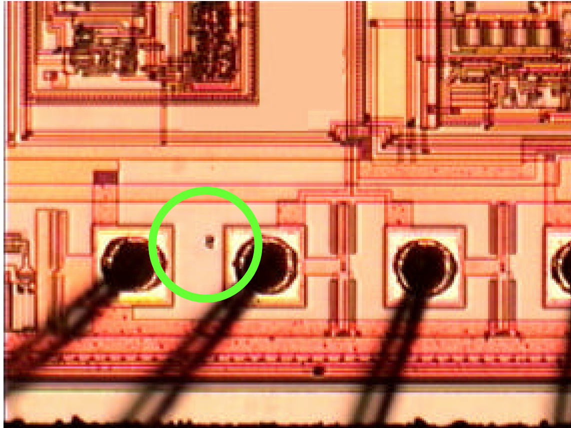
particle between barrier and metal 1



optical microscope

optical microscope

FESEM lower detector

FESEM lower detector 60° tilt

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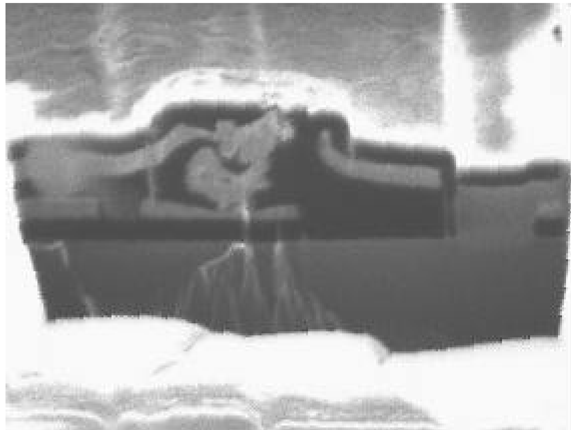
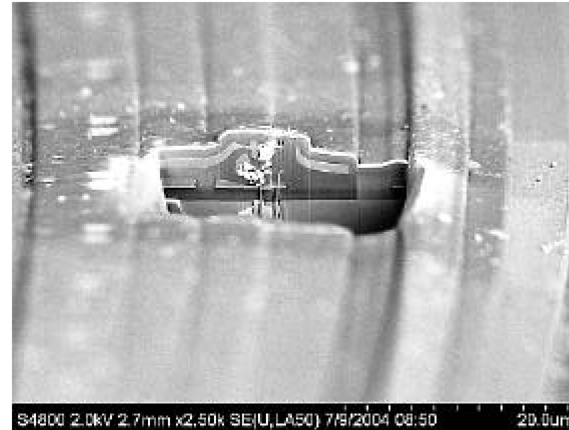
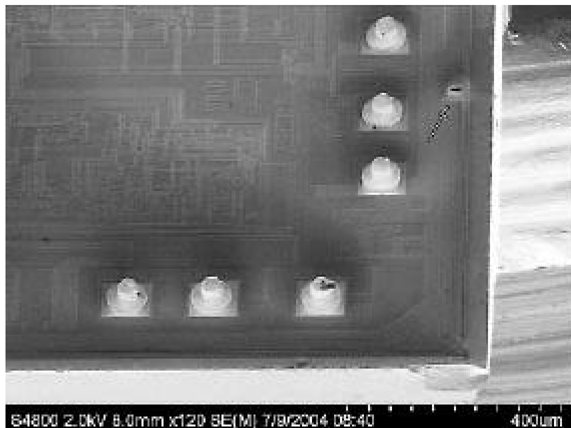
particle between barrier and metal 1



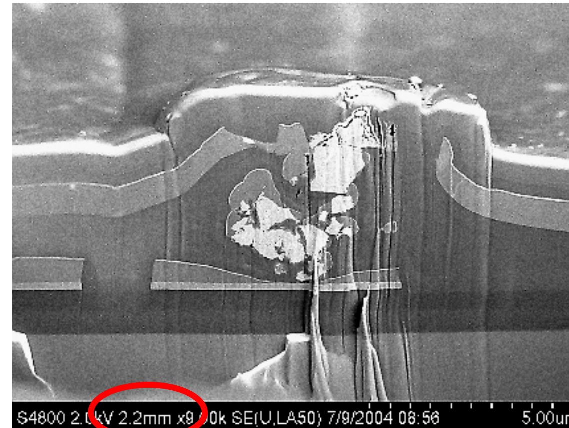
FIB



FESEM upper detector low angle BSE

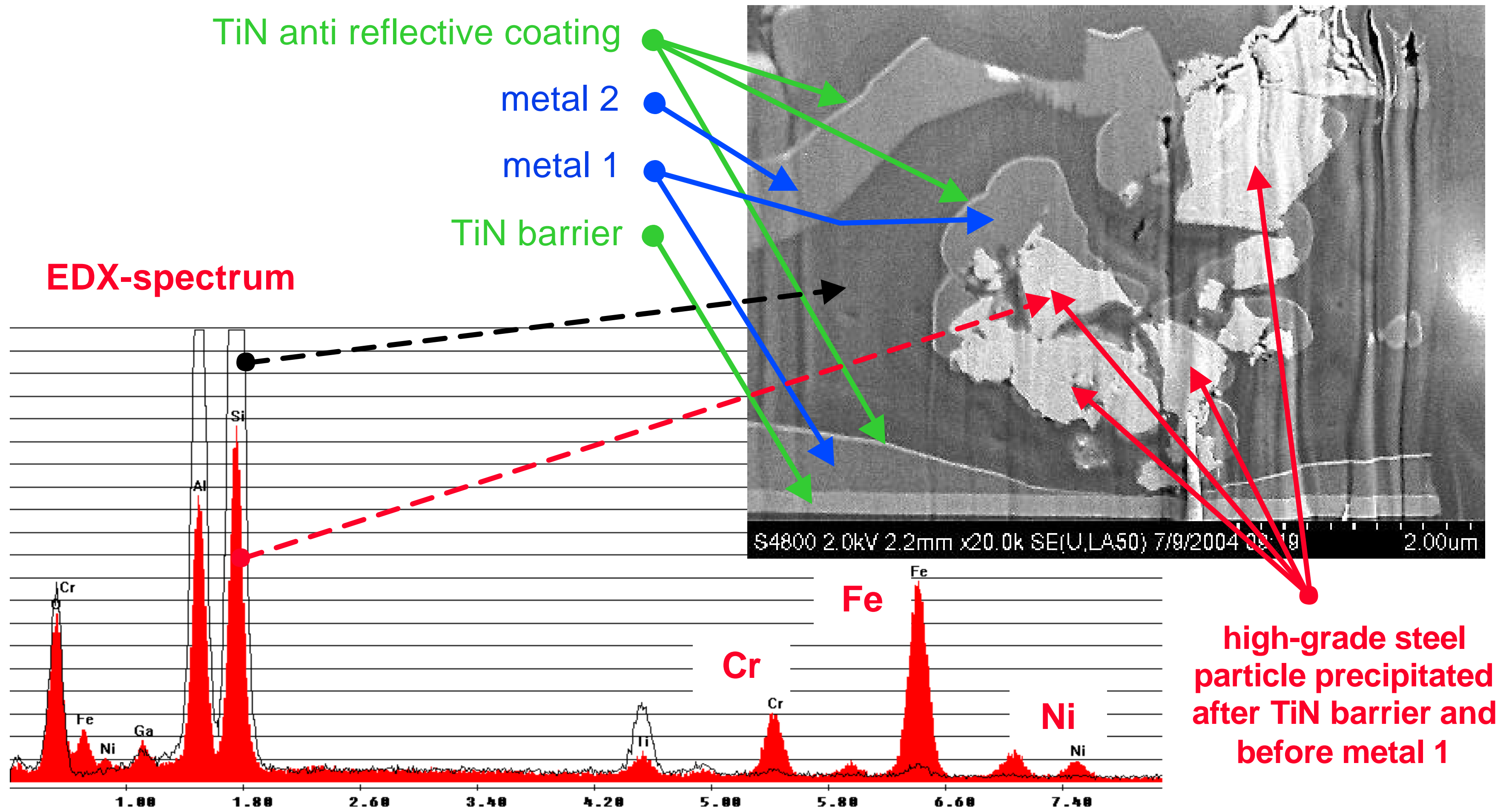


FESEM lower detector good focus depth
75° pretilt sample holder

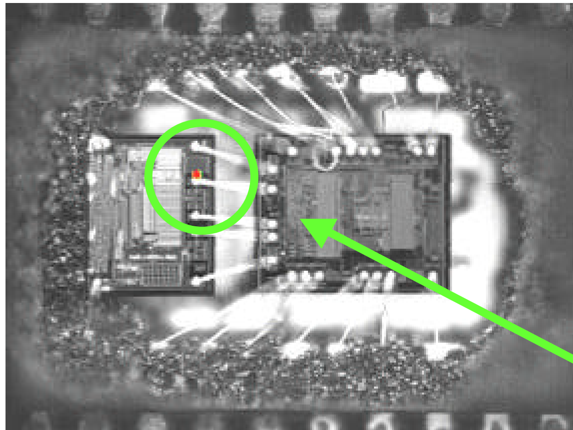


FESEM upper detector low angle BSE
low working distance 75° pretilt

particle between barrier and metal 1



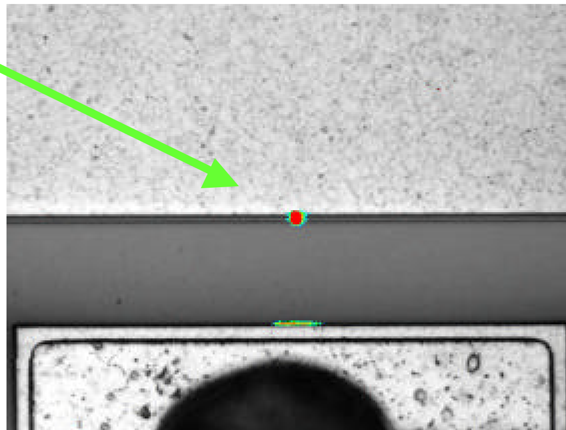
dielectric damage at capacitor edge



emission microscope

Hot spot

emission microscope



emission microscope

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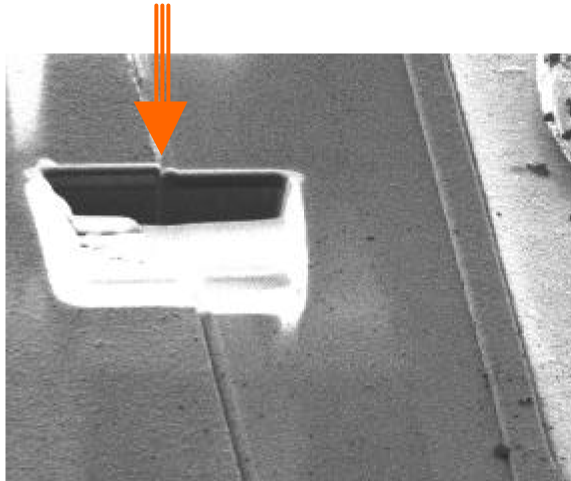
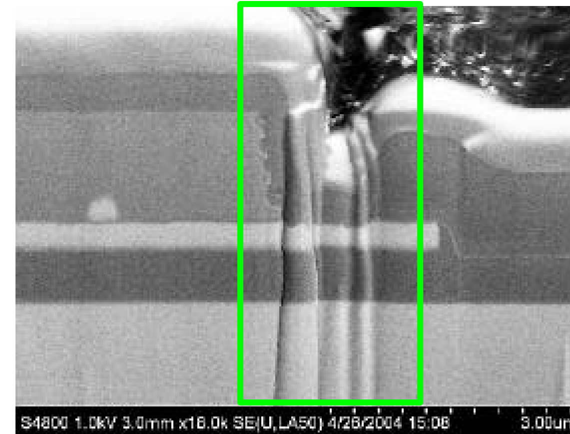
dielectric damage at capacitor edge



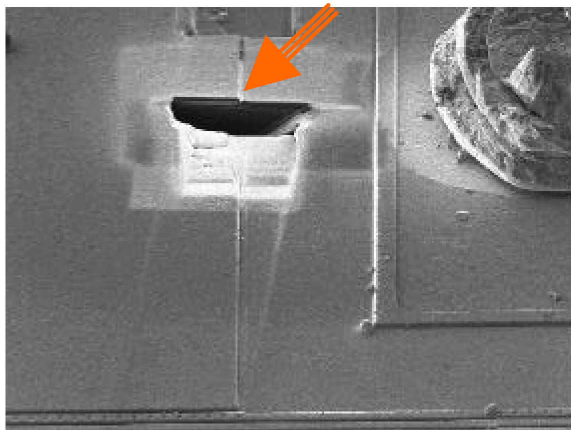
FIB

clean and polish with perpendicular ion beam



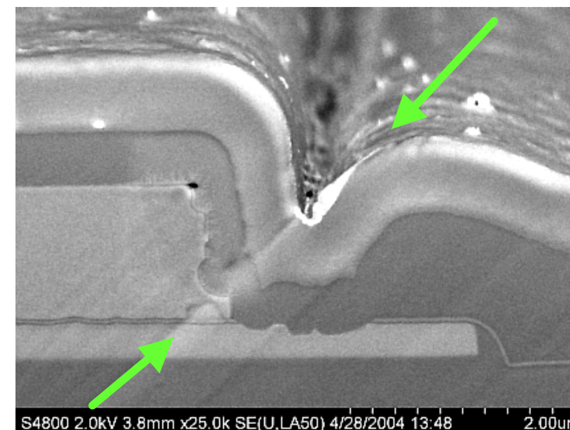
FESEM

The ion beam copies the topography of the surface to the point of interest.
A great disturbance like a curtain is visible at the surface of the x-section.



FIB

clean and polish with diagonal ion beam



FESEM

The changed tilt between beam and sample surface moves the disturbed area to a less important region.

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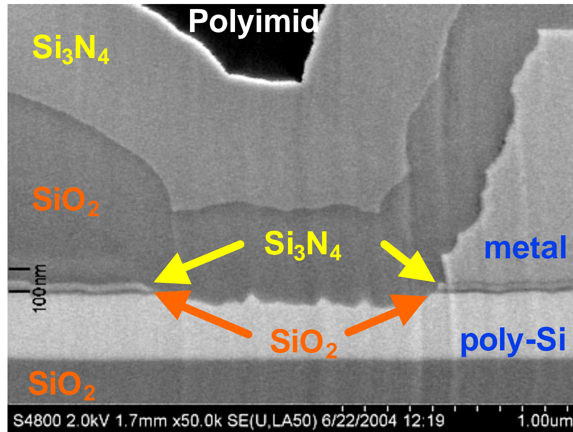
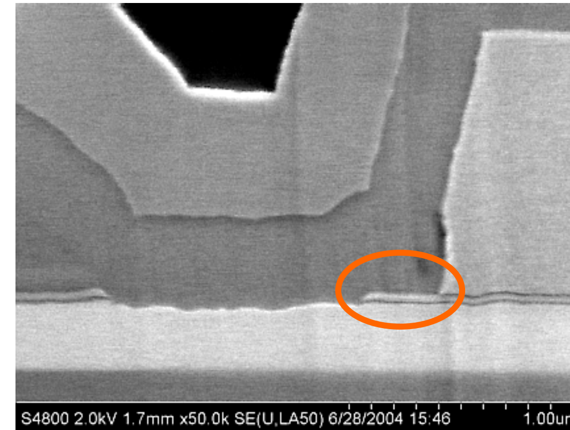
dielectric damage at capacitor edge



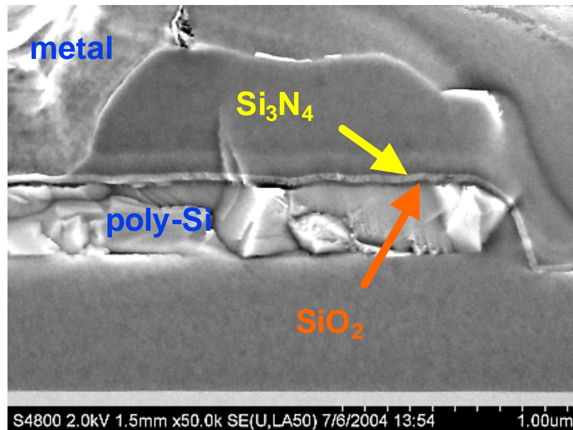
FESEM

old etch process



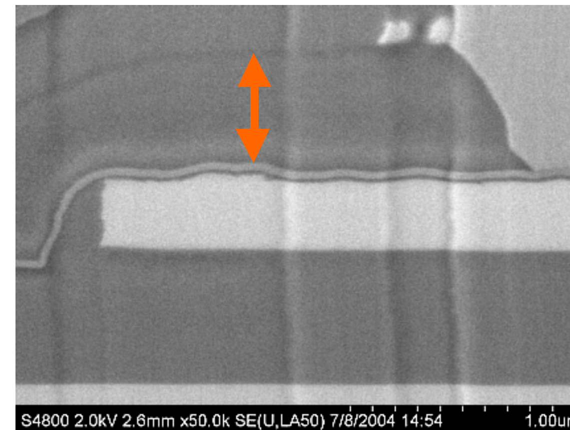
FESEM

modified etch process
more dielectric remaining



FESEM (cleft specimen)

new mask
additional $Si0_2$ layer
protects
dielectric layer



FESEM

new mask
additional $Si0_2$ layer
protects
dielectric layer

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Fast images of FIB x-sections using a CFESEM with BSE-TTL-detection

- easy transfer between FIB and SEM
- specimen mounting on a standard 15 mm stubs (3mm pin)
- stub mounting onto a 80° tilted sample adapter
- FIB x-section position near to the specimen edge (low SEM WD)
- FESEM with fast specimen exchange procedure
- FESEM with efficient TTL BSE-detection system at low keV
- *no etching or sputtering needed !!!*
- 1th picture with *all needed x-section information* within *about 10 minutes* after FIB polishing *!!!*