

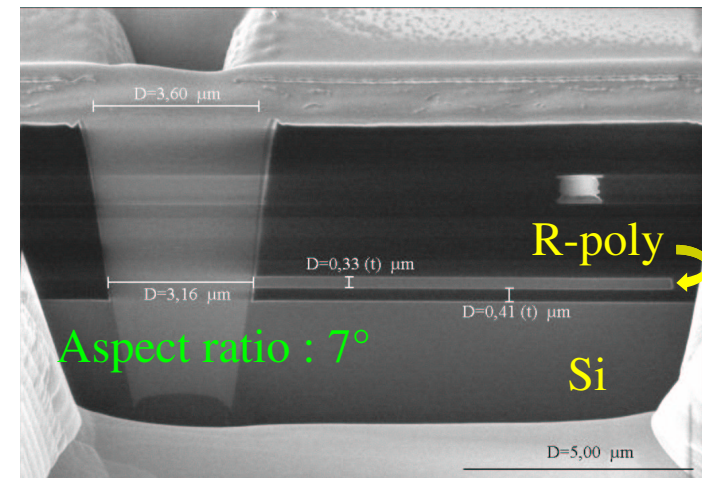
IC passive component modification using Focused Ion Beam

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What about FIB modifications of high current devices?

Our aim was to validate the influence of raising the resistance value of a resistive component on an IC gain. The problems related to the use of platinum for new connections are well known : Pt resistance is approximately 100 x times higher than Al one ; currents as high as several mA are fatal to modifications. We decided to try to modify the resistance through a reduction of the passive component volume.

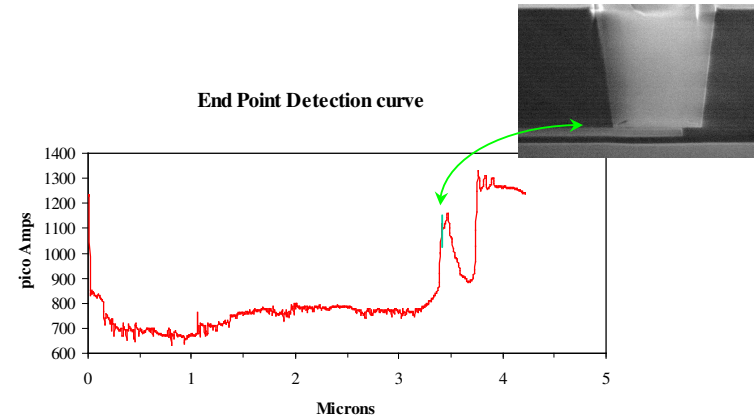
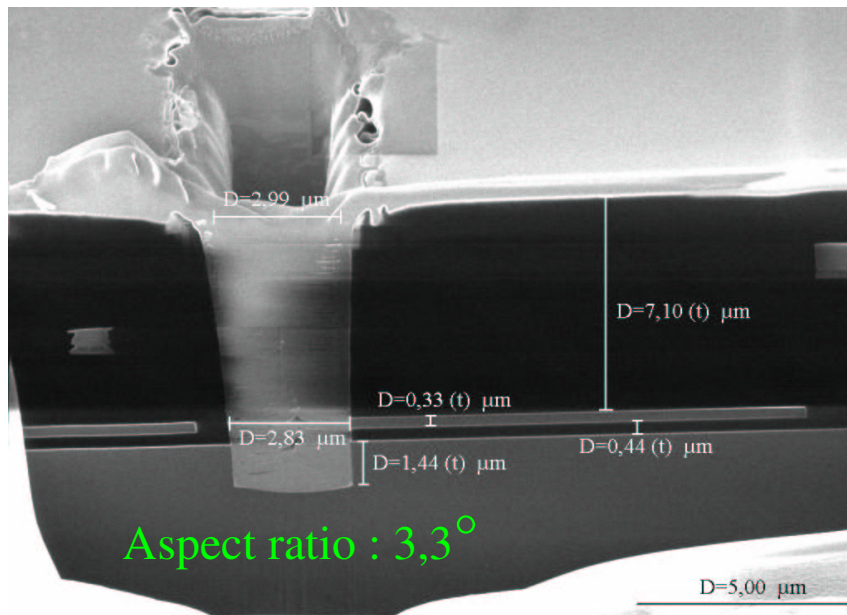
A limiting effect clearly appeared : tapering related to redeposition effect ; the aspect ratio of drilled hole is poor and the volume reduction of the resistive component is much lower than expected (measured width is 1.1 μm instead of 1.8 μm) ; as a consequence the performance improvement is not significant.



Which solutions ? : either anticipating on the aspect ratio effect by evaluating the adequate width of material to sputter, depending on the depth and the inclination of the hole rims (7° / vertical) or using enhanced etch technique to minimise the redeposition effect ; still the adequate width of material to sputter must be evaluated

EPD : Besides the variations of contrast which stay indicative of the nature of the sputtered material, End Point Detection curve appeared very useful to follow the different materials on the beam path.

Enhanced Etch technique has allowed to improve **the aspect ratio**, but this technique is very sensitive to the IC - iodine needle distance.



Electrical measurements confirmed the influence of these modifications on the IC performances. It was also possible to relate semi-quantitatively the sputtered volume with the IC gain improvement.

Conclusion

FIB technology allowed to increase of a desired value the resistance of a passive component.

Two questions :

- which solutions to decrease a resistance ?
- what are the advantages of using W for new connections instead of Pt ?