

CONCERNING THE MEASUREMENT OF P-WELL AND N-WELL SURFACES

Normally, when a profile must be run in a small area, we can adjust the bevel angle to provide as much resolution as possible within the depth of interest. Here is a case where it is not possible. To get the concentration at the surface of a well, we must profile the entire depth of the well.

The spreading resistance that we measure at a given depth is influenced by the resistivity distribution below this depth. To correct for this effect we need to know the resistivity distribution below the point we are measuring. To determine this resistivity distribution we have to profile down to a boundary (i.e. the junction or the substrate).

If we get to a junction, we can then assume no appreciable conduction below it. If we go to the substrate, we can assume a constant and measurable resistivity below our deepest point. We can then rebuild the layer one step at a time.

So even if your interest is, for example, only the top 1000 angstroms of the well, we still have to probe all the way through the well to get accurate values near the surface. If the pattern is small, we will have to bevel at a relatively steep angle, thus compromising the number of points in your depth of interest.

Also, (as we have been saying for years) we cannot measure the concentration in the MOS channel region to the degree of accuracy you would like. Well... not good enough to calculate the MOS threshold voltage. C-V analysis on a MOS capacitor is still your best bet.