Modified Automatic Four-Point Probe Model Mo-280 Series

Patent pending

FOUR DIMENSIONS INC.

Mo-280 Features

- Measure Solar Cell or Ion Implantation Test Wafer's **Junction Conductivity** from ***10^{-9} Siemens /cm²*** to ***10^{-2} Siemens /cm²***.
- Measure Solar Cell or Ion Implantation Tests Wafer's **Sheet Resistivity** from ***10^{-3} Ω / sq*** to ***8 x 10^{+5} Ω / sq.***

Measurement principle

By measuring sheet resistivity of the diffused or implanted layer on substrate with a four point probe and then measuring current at the zero potential probe of the four point probe and potential near this probe with a bias applied to the substrate, not only the sheet resistivity of the layer but also the conductivity of the junction of the layer to the substrate can be extracted. This is done base on the analysis as shown in the following reference:

J. Chen, D. Dimitrov, Chi-Yiu So,
Proc. of INSIGHT, California, 2007, p. 51.

System Setup

Modified Four-Point Probe is made by modifying one of the four point-probe systems such as those in model 280 I series, whose description can be found in brochure of Model 280 SI Series, as follows:

Modifications are mainly done by adding relays for enabling switching the wafer chuck and the four point probe needles between sheet resistivity measurement mode and junction conductivity measurement mode upon commend. Also a mathematical analysis program is added to the four-point probe software for enabling extraction of junction conductivity data from measurement results of sheet resistivity, current at the zero potential probe, and a potential on the layer near the zero potential probe with a bias applied to the substrate.

Applications

(a) Monitoring Solar Cell at Diffusion Step:

The more leaky is the P-N junction, the less efficient is the solar cell. This is explained in the attached PowerPoint presentation. Modified Four-Point Probe can be used to check whether the diffusion furnace is contaminated enough to cause non-negligible leakage and whether the wafer being used is of good enough quality by measuring the junction conductivity and sheet resistivity of the diffused layer. Of course, four-point probe measurement of sheet resistivity of the diffused layer can be used to check whether the diffusion process is uniform and has resulted in appropriate diffusion quantity.

(b) Checking USJ layer's Junction Leakage:

Junction shunt conductivity of the implanted layer on test wafer, including that of USJ can be determined with the highest accuracy as explained in the above mentioned reference.