

# CONTACTLESS RESISTIVITY & CHARGE CARRIER MOBILITY LIFETIME MAPPING OF HIGH RESISTIVITY SEMICONDUCTOR WAFERS (GaN, GaAs, InP, CdTe, CZT, etc...)

## *EU- $\rho$ - $\mu\tau$ -SCAN*

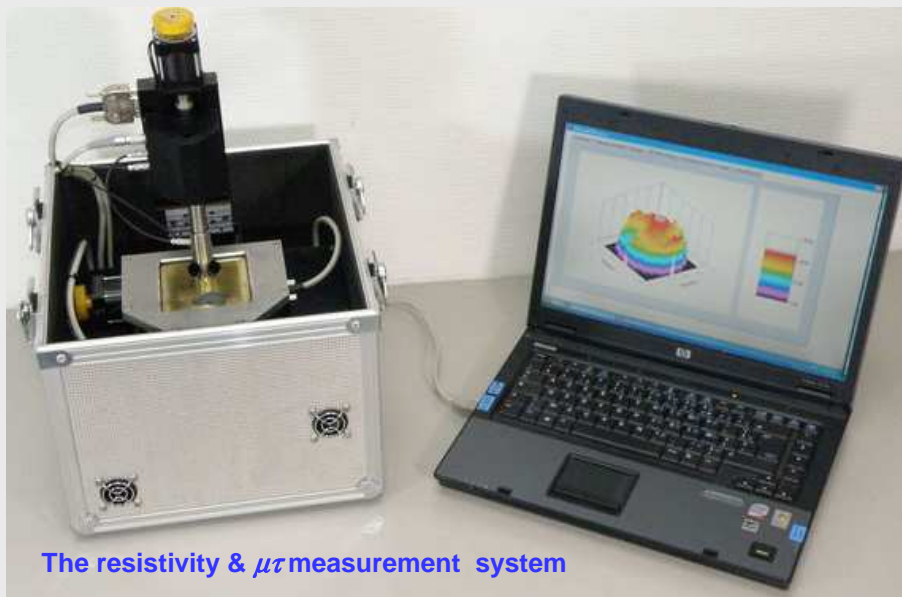
The characterisation of semiconductor wafers is an essential step in device production. Uniformity of **RESISTIVITY** and **MOBILITY LIFETIME** give precious information on the quality of wafers and therefore the devices. Performing these measurements without any direct contact with the wafers is important too, to reduce any possible contamination.

The **EU- $\rho$ - $\mu\tau$ -SCAN** is, to our knowledge, the first commercially available instrument incorporating two measurement systems in one, i.e. (i) the resistivity mapping and (ii) the  $\mu\tau$  products (electrons and holes) mapping.

**EU- $\rho$ - $\mu\tau$ -SCAN** instrument uses a contactless methods of material characterisation, i.e. avoiding the problems connected with the fabrication of ohmic contacts, it allows the examination of wafers without degrading surface quality.

In the **resistivity mapping** the sample is placed into a capacitor as a lossy dielectric substance and the resistivity is evaluated by measuring a time dependent charge transient observed after application of a voltage step

The same system allows safe measurements of **charge carrier mobility lifetime products** (electrons and holes) by applying the laser beam module instead of the commonly used alpha radioactive sources for such measurements.



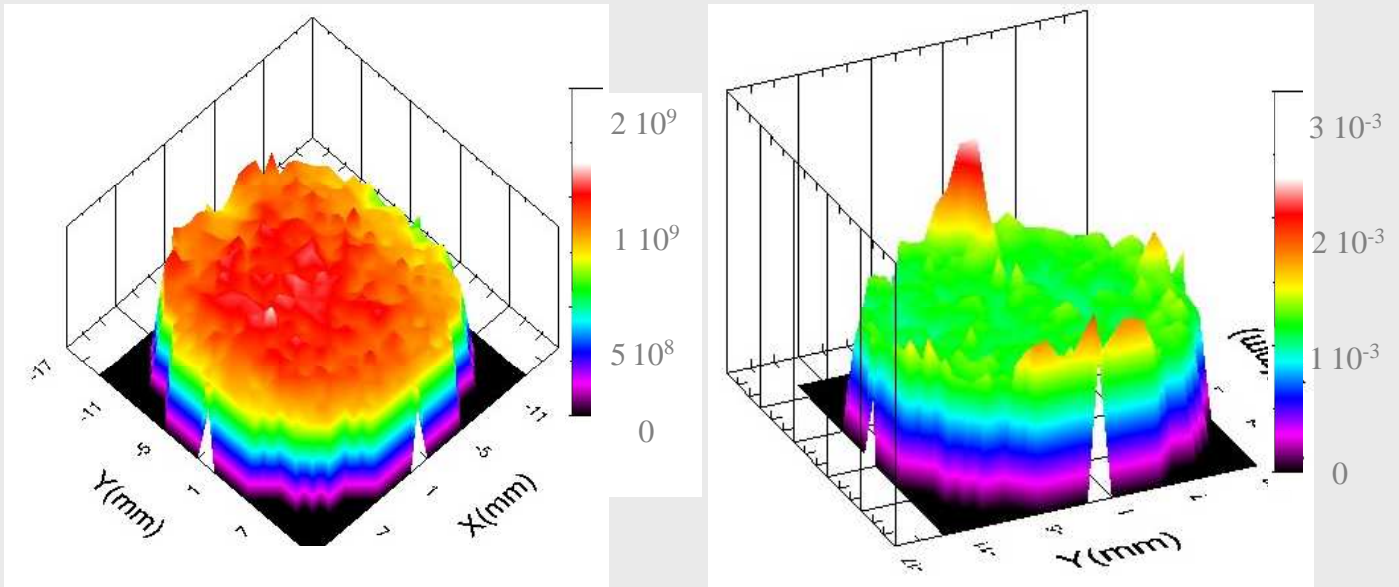
The resistivity &  $\mu\tau$  measurement system

### ***Materials to be characterised***

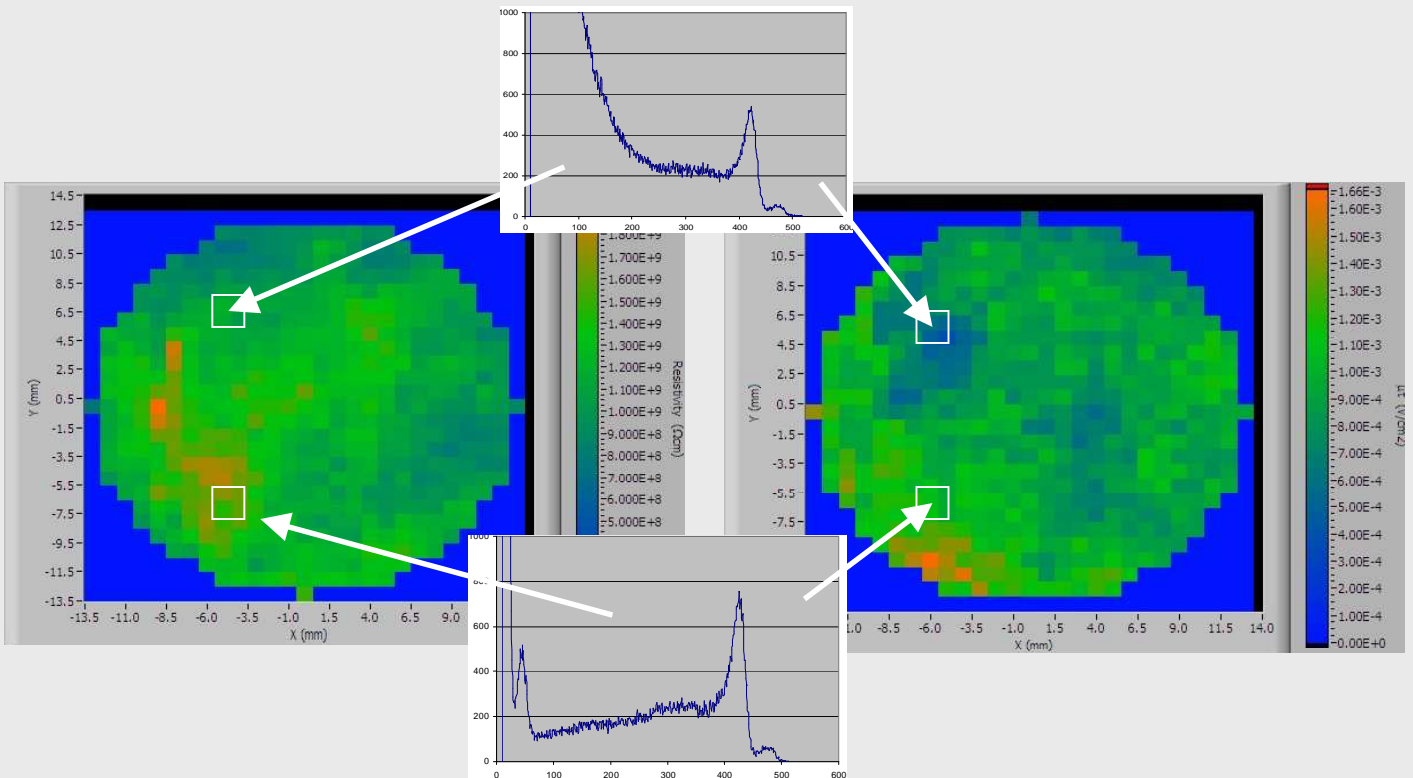
High resistivity semiconductors	Resistivity domain	$\mu\tau$ domain	Wafer size
<b>EXAMPLES:</b> Gallium Nitride (GaN) Gallium Arsenide (GaAs) Cadmium Telluride (CdTe) Cadmium ZincTelluride (CdZnTe) Cadmium ManganeseTelluride (CdMnTe) Indium Phosphide (InP)	$10^5 - 10^{11} \Omega\text{cm}$ as standard  From $10^3 \Omega\text{cm}$ on request	$10^{-6} - 10^{-1} \text{V/cm}^2$	$\phi$ 50 mm (2") as standard or larger on request  Thickness min. 0.5mm

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Real time resistivity (left) and electron mobility (right) mapping of semi-insulating wafer (32mm diameter).



Colour-coded resistivity (left) and electron mobility(right) maps of CdTe wafer ( $\phi$ 32mm) and  $^{57}\text{Co}$  spectra of selected detectors

The complete system is composed of:

- • Measurement units placed in compact aluminium box with X-Y table for sample positioning, detection head and necessary hardware and electronics.
- • PC unit with the software developed for resistivity and  $\mu\tau$  measurement purpose.
- User Manual