

Fields of Application

Thin-Film monitoring of:

- Transparent Conductive Oxides (ITO, ZnO, etc.)
- Metal Nanowires & Meshes
- Graphene
- Carbon Nanotubes
- Metal layers (Al, Mo, Au, etc.)

Offers

- Non-contact sheet resistance measurement
- Simultaneous measurement of anisotropy / optical transmission
- Film thickness measurement and monitoring
- Inline-monitoring (ex-vacuo and in-vacuo)
- Detection of deposition inhomogeneities
- Imaging of conductivity-related characteristics

Characterization of Thin Films

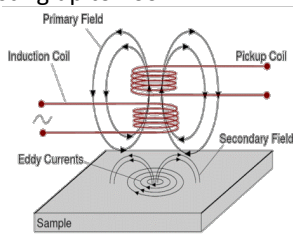
Eddy current technology

Benefits of High Frequency Testing up to 100 Mhz

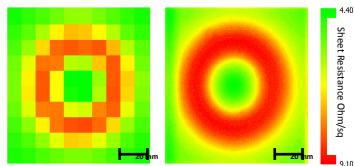
Signal Amplitude

$$U_{ind} = \frac{-d\phi}{dt}$$

- + Contact-free
- + High sample rate
- + High sensitivity
- + Measurement of encapsulated layers

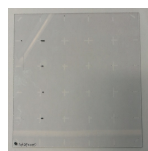


Contactless sheet resistance mapping of TCO layers

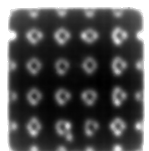


Left: Four-point probe (RM3-AR Jandel) with 100 points manual measurement
Right: Automated Eddy Current C-Scan with EddyCus® TF map 2020SR

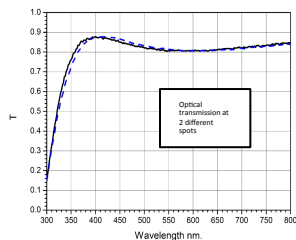
Determination of optical transmission



Photograph of ITO on glass

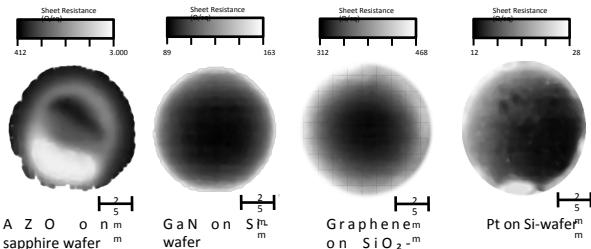


Mapping of structured ITO on glass



Optical transmission at 2 different spots

Conductivity mapping of thin films on wafer



AZO on sapphire wafer

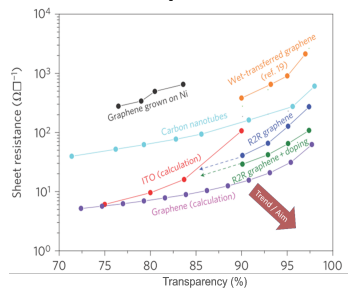
GaN on Si wafer

Graphene on SiO₂-m

Pt on Si-wafer^m

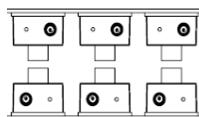
Drivers in Research & Development

Sheet resistance
vs.
optical transmission



S. Bae et al. Nature Nano. 5, 571 (2010); Daniel Neumaier; Proceedings TCO/TCM WS 2013 (2013)

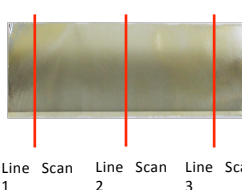
Inline sheet resistance measurement



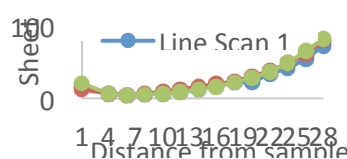
Inline sheet resistance monitoring with 3 measurement lanes



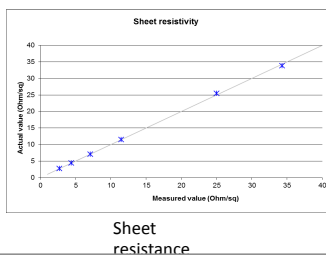
Supercapacitor foil



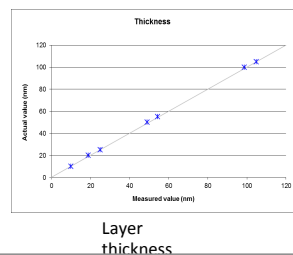
Line Scan 1
Line Scan 2
Line Scan 3



Accuracy in comparison to actual values



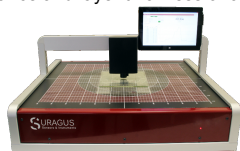
Sheet resistivity



Thickness

Eddy Current Testing Devices for Thin Film and Multi-Layer Systems

"EddyCus® TF lab" for monitoring sheet resistance and layer thickness of conductive thin films



New options:
+ Optical transmission
+ Electrical anisotropy

"EddyCus® TF map" for automated high resolution mapping of sheet resistance and layer thickness of conductive thin films



"EddyCus® TF inline" for inline monitoring sheet resistance and layer thickness of conductive thin films

