Efficient Testing Solutions

SURAGUS
Sensors & Instruments

EddyCus® TF lab 2020A – Anisotropy Tester

P_T_2020A_21

Highlights

- Contact-free and real time
- Accurate single-point measurement
- Manual mapping guided by easy-to-handle software
- Measurement of encapsulated layers
- Characterization of multilayer materials upon request

Device Series

- Metal thickness (nm, µm)
- Sheet resistance (Ohm/sq)
- Emissivity
- Conductivity / resistivity (mOhm cm)
- Electrical anisotropy (%)
- Weight (g/m²) and drying status (%)
- Permeability (H/m) *Beta*

Applications

- Touch panel sensors (TPS)
- Printed electronics
- Wearable electronics
- Smart textiles
- Photovoltaics
- Smart / switchable films
- Medical surfaces and devices
- Biological sensors
- Aerospace, automotive, transportation
- Semiconductor and memory
- Energy storage

Materials

- Nanowire films
    - Conductive NW (Ag, Ni, Pt, Au)
    - Semiconductor NW (Si, SiC)
    - Magnetic NW (Fe_3O_4–AgNWs)
    - Multilayer NW (ZnO/AgNW/ZnO)
- Carbon Nano Tubes and Buds
- Fiber reinforced composites
- Metal meshes, smart meshes
- Anisotropic grain / domain materials
- Anisotropic effect / defect directions (cracks, line defects)

SURAGUS GmbH
Maria-Reiche-Strasse 1
01109 Dresden
Germany

For further questions:
+49 351 32 111 520
sales@suragus.com

Visit us at:
www.suragus.com
www.suragus.com/calculator
www.suragus.com/EddyCusLab2020

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TÜV SÜD ISO 9001

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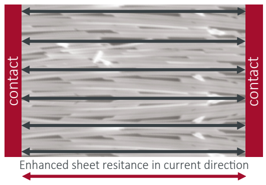
Anisotropy Term and Concept

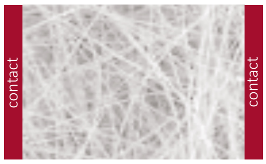
- Electrical anisotropy refers to a difference in electrical resistance depending on the direction of current flow
- Wire and mesh structures can have anisotropic resistances
- Bulk materials with dominant directional characteristics / effects / defects can also have electrical anisotropy
- Anisotropy can be optimized to the layout of the contacts
- Anisotropy can save material and improve optical transparency to sheet resistance ratio

- Described by anisotropy direction and strength
- Both characteristics must be obtained at the same position
- The anisotropy strength is calculated using the lowest and highest resistance that align in perpendicular directions
- Inline deposition, e.g. slot die coating on moving web, tends to create lower resistances in machine direction "MD" and higher resistance in traversing direction "TD"
- Calculation as ratio of lowest and highest resistance

Anisotropic Wire Film

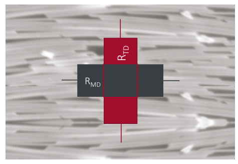


Isotropic Wire Film



$$\text{Anisotropy Ratio} = \frac{R_{HIGHEST}}{R_{LOWEST}}$$

$$\text{Anisotropy Ratio} = \frac{R_{TD}}{R_{MD}}$$



Device Characteristics

Measurement technology	Non-contact eddy current sensor with directed current induction
Substrates	Foils, glass, wafer, etc.
Substrate area	8 inch / 204 mm x 204 mm (open on three sides)
Max. sample thickness / sensor gap	3 / 5 / 10 / 25 mm (defined by the thickest sample)
Sheet resistance range	0.01 – 1,000 Ohm/sq; 1 to 5 % accuracy
Anisotropy range (TD/MD)	0.33 – 3 (larger upon request)
Device dimensions (w/h/d) / weight	11.4" x 5.5" x 17.5" / 290 mm x 140 mm x 445 mm / 10 kg
Further available features	Metal thickness, sheet resistance, emissivity, resistivity, weight and drying status and also permeability (*beta*) measurement

Device Control and Software