

## EddyCus<sup>®</sup> TF lab 2020A – Anisotropy Tester

P\_T\_2020A\_20



### 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

### Applications

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

### Device Series

- ▶ Metal thickness (nm,  $\mu\text{m}$ )
- ▶ Sheet resistance (Ohm/sq)
- ▶ Emissivity
- ▶ Conductivity / resistivity (mOhm·cm)
- ▶ Electrical anisotropy (%)
- ▶ Weight ( $\text{g}/\text{m}^2$ ) and drying status (%)
- ▶ Permeability (H/m) *Beta*

### Materials


- ▶ Nanowire films
  - ▶ Conductive NW (Ag, Ni, Pt, Au)
  - ▶ Semiconductor NW (Si, SiC)
  - ▶ Magnetic NW ( $\text{Fe}_3\text{O}_4$ -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](mailto:sales@suragus.com)

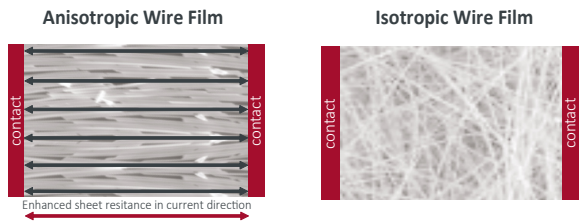
Visit us at:  
[www.suragus.com](http://www.suragus.com)  
[www.suragus.com/calculator](http://www.suragus.com/calculator)  
[www.suragus.com/EddyCusLab2020](http://www.suragus.com/EddyCusLab2020)

Engineered and Made in Germany 



## Anisotropy Term and Concept

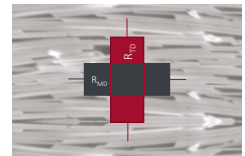
- ▶ Electrical anisotropy refers to a difference in electrical resistance depending on the direction of current flow
- ▶ Wire and mesh structures can have anisotropic resistances
- ▶ Bulk materials with dominant directional characteristics / effects / defects can also have electrical anisotropy
- ▶ Anisotropy 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



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



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



## 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	1 / 2 / 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 ( <i>beta</i> ) measurement

## Device Control and Software

Id	Time	Series N.	Value	Unit
20	10:19:23	Sample 1	1.14e+00	Ohm/Sq
21	10:19:23	Sample 2	1.14e+00	Ohm/Sq
22	10:19:40	Sample 3	1.28e+00	Ohm/Sq
23	10:19:40	Sample 4	1.28e+00	Ohm/Sq