

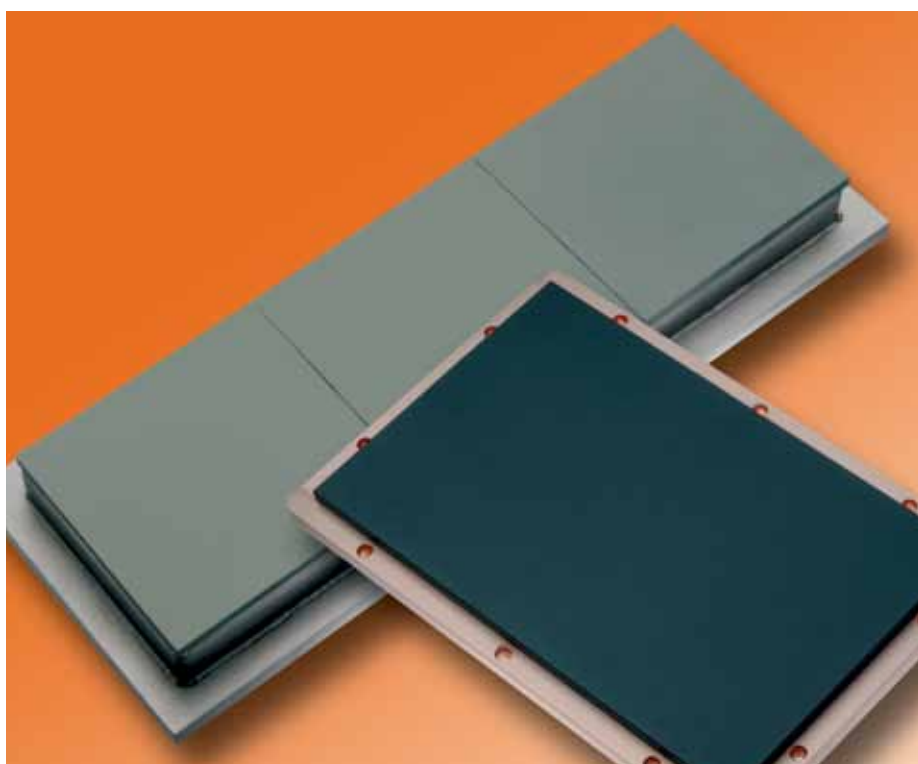
TCOs for Semiconductor Applications



Umicore Thin Film Products

Umicore Thin Film Products, a globally active business unit within the Umicore Group, is one of the leading producers of coating materials for physical vapor deposition with more than 50 years experience in this field. Its Semiconductor portfolio covers a wide range of highly effective sputtering targets and evaporation materials.

Transparent Conductive Oxides (TCOs) are used for creating thin conductive layers for a variety of semiconductor applications such as LEDs and sensors. The desired combination of electrical conductivity and other physical properties is achieved by varying the type and mixing ratio. We are established specialists in indium tin oxide (ITO) and doped zinc oxide (ZnO).



Selection of TCO sputtering targets

Transparent Conductive Oxides for Semiconductor Applications

Production Process

Our TCO sputtering targets are produced from engineered powders by state-of-the-art blending and consolidation. This ensures defined physical properties and uniformity throughout the targets. The electrical conductivity of the targets allows DC-sputtering.

Analysis

All materials are tested in our leading edge analytical laboratory or in one of our associate laboratories:

- › Differential thermo-analysis (DTA) combined with thermogravimetry (TG)
- › Glow Discharge Mass Spectrometry (GDMS)
- › X-ray fluorescence analysis (XRF)
- › Density measurement (Archimedes principle)
- › Microstructure investigation

Density

The density depends on the type and composition. For ITO typical densities above 99% are reached.

Composition

A wide range of compositions is available. A commercially widely accepted concentration for ITO is $\text{In}_2\text{O}_3/\text{SnO}_2$ 90/10 wt%. Doping of ZnO can be achieved with a variety of elements such as Al or Ga. Typical doping concentrations are in the range of 1 – 10 wt%. Other elements can be applied according to customer specifications.

Purity

The purity of alloying components is chosen to give the best price/quality ratio. Qualities up to 4N (99.99%) can be offered for ITO. For ZnO, typical qualities up to 3N (99.9%) have been achieved.

Dimensions

Due to our dynamic management processes diameters up to 300 mm (active surface) are supplied within a short time frame. Various geometries, also rectangular, are available.

Bonding

Umicore Thin Film Products uses its own proprietary bonding method, based on a flux-free solder technique. Thin film adhesion and diffusion barrier layers are applied to the back of each target, followed by a temperature controlled metallic solder seal between target and backing plate. The bonding is compliant to accommodate mechanical and thermal stress.

Packaging

Final cleaning and packaging is completed under clean room conditions. All targets are vacuum sealed in polyethylene bags, guaranteeing consistent target performance, even when stored for a longer period of time.

Quality Assurance

The Balzers location is certified according to ISO 9001, ISO 14001 and OHSAS 18001 standards. All other production sites are also ISO 9001 and ISO 14001 certified. Documentation, process specifications, traceability, sophisticated analytical methods, and continuously trained employees guarantee the highest and most consistent product reliability.

Please find your local sales partner at:
www.thinfilmproducts.umicore.com

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