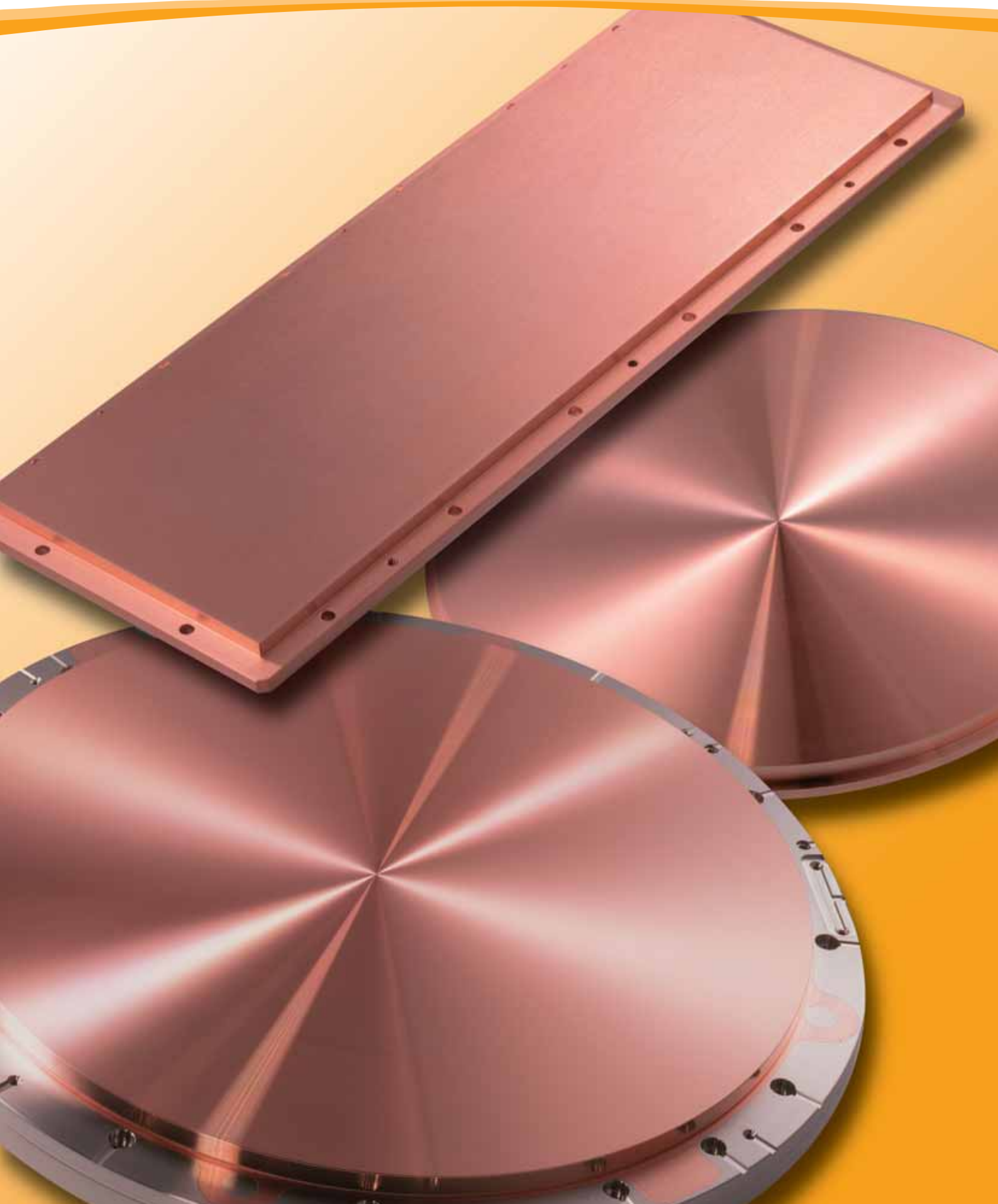


Cu for Semiconductor Applications



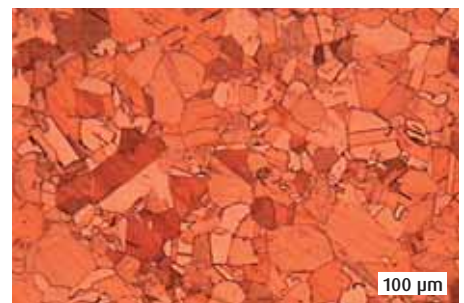
Umicore Thin Film Products

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.

Copper for Semiconductor technology is used for front end applications as well as for advanced packaging, e.g. Flip-Chip technology, and in a variety of compounds. Umicore Copper targets are available in several grades to match customers needs.



Copper Ring Targets



Standard structure



Fine grain structure

Cu for Semiconductor Applications

Production Process

Our Copper sputtering targets for Semiconductor applications are vacuum melt and cast. Special thermomechanical heat treatment processes guarantees a uniform structure optimized to the different target geometries.

Analysis

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

- › Glow Discharge Mass Spectrometry (GDMS)
- › Hot Gas Extraction (LECO)
- › Metallographic Investigation

Microstructure

Due to the optimized thermomechanical treatment steps our Copper has a uniform, isotropic grain structure. The grain size depends on the target design and copper purity. Three different qualities are available. Typical micrographs are shown on page 2.

Standard grain: grain size max. 500 µm

Fine grain: grain size max. 200 µm

Extra fine grain: grain size max. 100 µm

Purity

Three different standard purity grades are available: 4N5, 4N5+, and 6N. This purity grades are tailored to reach the best cost/performance ratio. Other purities upon request.

Trace Impurities

A selection of the typical impurity values is listed for the three different grades.

Metallic Element	Standard 4N5	Fine grain 4N5+	Extra fine grain 6N
Ag	14	13	0.3
As	< 2	1.3	0.05
Bi	0.5	0.5	0.01
Cd	< 1	< 0.01	0.05
Fe	1.1	1.1	0.3
Mn	< 0.2	< 0.1	0.02
Ni	3	3	0.1
P	< 1	0.01	0.05
Pb	1	0.9	0.05
Sb	1	1	0.05
Sn	< 1	0.1	0.1
Zn	< 1	0.1	0.1
Non-metallic Element			
C	< 1	< 1	< 1
O	1.1	< 1	< 1
S	5	3.8	< 1

All values are listed in ppm.

Dimensions

Due to our dynamic management processes, different dimensions (ø up to 400mm, length up to 800 mm) can be realized within a short period of time. Targets are available in monoblock or bonded versions.

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 argon-filled polyethylene bags, guaranteeing consistent target performance, even when stored for a longer period of time.

Quality Assurance

Our quality assurance process is ISO 9001:2000 certified to guarantee the highest and most consistent product reliability. Documentation, traceability, statistical process control, detailed test and process specifications as well as sophisticated analytical methods and continuously trained employees are important elements of our quality assurance process.

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

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