



Copper Solutions

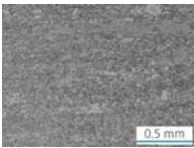
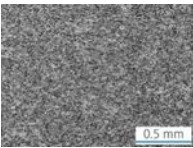
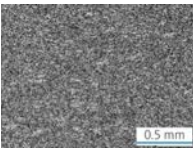
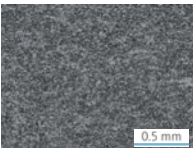
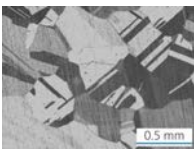
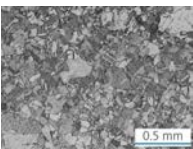
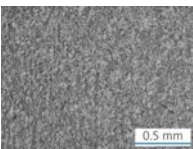
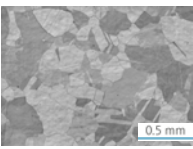


Copper-ceramic substrates using Al₂O₃, AlN and Si₃N₄ ceramics and produced by direct copper bonding (DCB) or active metal brazing (AMB) are preferred and established solutions in power electronic applications.

Thick copper layers for high current carrying capacity, high thermal conductivity, and a low coefficient of thermal expansion are the unique attributes of copper-ceramic substrates.

Solutions for bonding processes (DCB)					
Alloy name		ETP	OFE	Aurubis DCuB2 / PNA 402*	Aurubis PNA 403
UNS		C110	C101	C101	C101
Melting point	Liquidus temperature	1,083°C	1,083°C	1,083°C	1,083°C
	Solidus temperature	1,065°C	1,083°C	1,083°C	1,083°C
Density		8.93 g/cm ³	8.93 g/cm ³	8.93 g/cm ³	8.93 g/cm ³
Heat capacity at 20°C		0.386 J/gK	0.390 J/gK	0.390 J/gK	0.390 J/gK
Thermal conductivity at 20°C		394 W/mK	394 W/mK	394 W/mK	394 W/mK
Electrical conductivity at 20°C		101 % IACS	101 % IACS	101 % IACS	101 % IACS
Coefficient of thermal expansion at 20–300°C		17.3 10 ⁻⁶ ·K ⁻¹	17.7 10 ⁻⁶ ·K ⁻¹	17.7 10 ⁻⁶ ·K ⁻¹	17.7 10 ⁻⁶ ·K ⁻¹

* including special processing

Microstructure after bonding process T > 1,050°C					
Alloy name		ETP	OFE	Aurubis DCuB2 / PNA 402*	Aurubis PNA 403
UNS		C110	C101	C101	C101
Microstructure before bonding					
Microstructure after bonding					
Grain size after bonding		< 2000 µm inhomogeneous	< 500 µm inhomogeneous	< 150 µm homogeneous	200-400 µm homogeneous

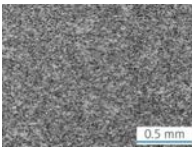
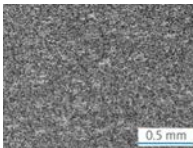
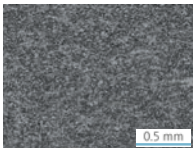
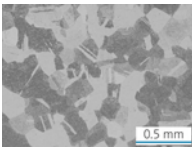
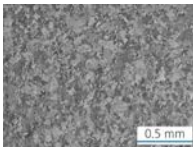
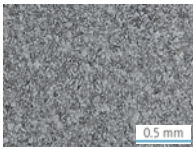
* including special processing

Aurubis provides dedicated copper strip products that fulfill the special requirements of the bonding and brazing processes used to create copper-ceramic substrates. These strips are produced in a special

process at Aurubis Pori (Finland) and Aurubis Stolberg (Germany). Aurubis also works to continually improve the properties of these specialty products and adapt the material behavior to customers' process conditions.

Solutions for brazing processes (AMB)				
Alloy name		Aurubis PNA 404	Aurubis DCuB1	Aurubis PNA 405/DCuB5
UNS		C101	C101	
Melting point	Liquidus temperature	1,083°C	1,083°C	1,083°C
	Solidus temperature	1,083°C	1,083°C	1,083°C
Density		8.93 g/cm ³	8.93 g/cm ³	8.94 g/cm ³
Heat capacity at 20°C		0.390 J/gK	0.390 J/gK	0.390 J/gK
Thermal conductivity at 20°C		394 W/mK	394 W/mK	394 W/mK
Electrical conductivity at 20°C		101 % IACS	101 % IACS	101 % IACS
Coefficient of thermal expansion at 20–300°C		17.7 10 ⁻⁶ ·K ⁻¹	17.7 10 ⁻⁶ ·K ⁻¹	17.7 10 ⁻⁶ ·K ⁻¹

* including special processing

Microstructure after bonding process T > 1,050°C				
Alloy name		Aurubis PNA 404	Aurubis DCuB1	Aurubis PNA 405/DCuB5
UNS		C101	C101	
Microstructure before bonding				
Microstructure after bonding				
Grain size after bonding		200-400 µm homogeneous	< 150 µm homogeneous	< 100 µm homogeneous

* including special processing



Metals for Progress



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