NanoBond® of Ceramic & Metal Sputtering Targets

APPLICATION NOTE

NanoFoil® can be used to bond **ceramic and brittle non-ceramic** (silicon or carbon) sputtering targets. For this process, the solder is pre-applied to the target and backing plate and machined flat. Then the NanoFoil is placed between the pre-coated surfaces, pressure is applied, and the foil is activated, melting the solder and creating the bond.

Below are the incoming requirements for the standard NanoBond® process. The standard backing plate material used is copper unless otherwise stated. Bonding to other backing plate materials, such as aluminum, molybdenum, and stainless steel is also possible.

Ceramics to which solder is applied with the aid of a heated ultrasonic wand:

- $AlMgB_{14}$+TiB_2
- Aluminum oxide (Al_2O_3)
- Aluminum-zinc oxide (AZO)
- Boron carbide (B4C)
- Borosilicate glass
- Carbon-graphite
- Hafnium oxide
- Indium-tin oxide (ITO)
- Silicon
- Silicon carbide (SiC)
- Silicon dioxide (SiO_2)
- Titanium carbide (TiC)
- Titanium nitride (TiN)
- Zinc oxide (ZnO)

Incoming requirements for standard products

Target Material	Bond Area (upper limits)*	Target Thickness (lower limit)	Backing Plate Thickness (lower limit)	Target Flatness	Backing Plate (BP) Flatness	Target / BP Accumulative Flatness	Target Surface Roughness
Other materials not listed below	length ≤ 1067mm (42") width ≤ 559mm (22") diam ≤ 559mm (22")	≥ 6mm (0.24")	≥ 8mm (0.31")	Better than 0.002mm/10mm (0.0002"/1")	Better than 0.01mm/10mm (0.001" / 1")	Better than 0.011mm/10mm (0.0011" / 1")	> 0.5µm (20µin)
Borosilicate silicon dioxide	length ≤ 1067mm (42") width ≤ 559mm (22") diam ≤ 559mm (22")	≥ 6mm (0.24")	≥ 11mm (0.43")	Better than 0.002mm/10mm (0.0002"/1")	Better than 0.01mm/10mm (0.001" / 1")	Better than 0.011mm/10mm (0.0011" / 1")	> 0.5µm (20µin)
Carbon graphite	length ≤ 1067mm (42") width ≤ 559mm (22") diam ≤ 559mm (22")	≥ 6mm (0.24")	≥ 8mm (0.31")	Better than 0.005mm/10mm (0.0005"/1")	Better than 0.01mm/10mm (0.001"/1")	Better than 0.013mm/10mm (0.0013"/1")	> 0.5µm (20µin)
Silicon bonded to copper	length ≤ 1067mm (42") width ≤ 559mm (22") diam ≤ 559mm (22")	≥ 6 mm (0.24")	≥ 11 mm (0.43")	Better than 0.002mm/10mm (0.0002"/1")	Better than 0.01mm/10mm (0.001" / 1")	Better than 0.011mm/10mm (0.0011" / 1")	> 0.25µm (10µin)
Silicon bonded to molybdenum	length ≤ 1067mm (42") width ≤ 559mm (22") diam ≤ 559mm (22")	>= 6 mm (0.24")	>= 6 mm (0.24")	Better than 0.002mm/10mm (0.0002"/1")	Better than 0.01mm/10mm (0.001" / 1")	Better than 0.011mm/10mm (0.0011" / 1")	> 0.25µm (10µin)

*Larger bond areas are possible, please contact one of Indium Corporation's Technical Support Engineers for more information

See reverse side for NanoBond of Metal Sputtering Targets →

Form No. 98567 R1

www.indium.com/nanofoil NanoFoil@indium.com

ASIA: Singapore, Cheongju: +65 6268 8678
CHINA: Suzhou, Shenzhen, Liuzhou: +86 (0)512 628 34900
EUROPE: Milton Keynes, Torino: +44 (0)1908 580400
USA: Utica, Clinton, Chicago: +1 315 853 4900

INDIUM CORPORATION®

NanoBond® of Ceramic & Metal Sputtering Targets

APPLICATION NOTE

NanoFoil® can be used to bond **metal and metal/ceramic** sputtering targets. For this process, the solder is pre-applied to the target and backing plate and machined flat. Then the NanoFoil is placed between the pre-coated surfaces, pressure is applied, and the foil is activated, melting the solder and creating the bond.

Below are the incoming requirements for the standard NanoBond® process. The standard backing plate material used is copper. Bonding to other backing plate materials, such as aluminum, molybdenum, and stainless steel is also possible.

Metals to which solder is applied with the aid of flux	Metals to which solder is applied with the aid of mechanical agitation	Metals to which solder is applied with the aid of ultrasound*	Metals to which no solder is applied
Cobalt Copper Copper-silver alloys Nickel Nickel-iron alloys Platinum Ruthenium	Aluminum Aluminum-copper Aluminum-silicon Aluminum-neodymium Other aluminum alloys	Aluminum-titanium alloys Chromium** Iron-cobalt Manganese Manganese-iridium Molybdenum Nickel-chrome Nickel-titanium Niobium Stainless steel Tantalum Titanium Titanium-niobium Tungsten Tungsten-titanium	Copper-gallium Copper-indium-gallium Indium Indium-sodium Tin

*Standard procedure is to grit blast surfaces of these materials to a Ra roughness = 2.5µm (100µ") prior to solder application

**Chromium has an incoming surface roughness requirement of Ra > 0.5µm (20µ"), since grit blasting chromium is hazardous

Incoming requirements for standard products

Target Material	Bond Area (upper limits)***	Target Thickness (lower limit)	Backing Plate Thickness (lower limit)	Target Flatness	Backing Plate (BP) Flatness	Target/BP Accumulative Flatness
All metals listed above	length ≤ 1067mm (42") width ≤ 559mm (22") diam ≤ 559mm (22")	≥ 2.5mm (0.1")	≥ 6mm (0.24")	Better than 0.01mm/10mm (0.001"/1")	Better than 0.01mm/10mm (0.001"/1")	Better than 0.015mm/10mm (0.0015"/1'

***Larger Bond Areas are possible, please contact one of Indium Corporation's Technical Support Engineers for more information

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