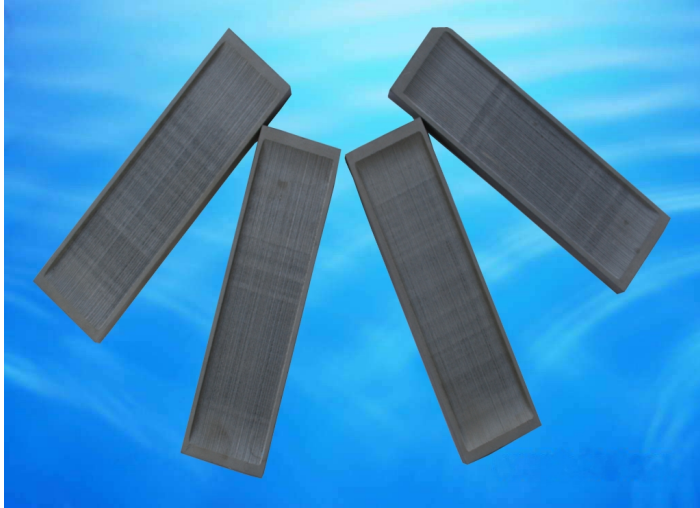


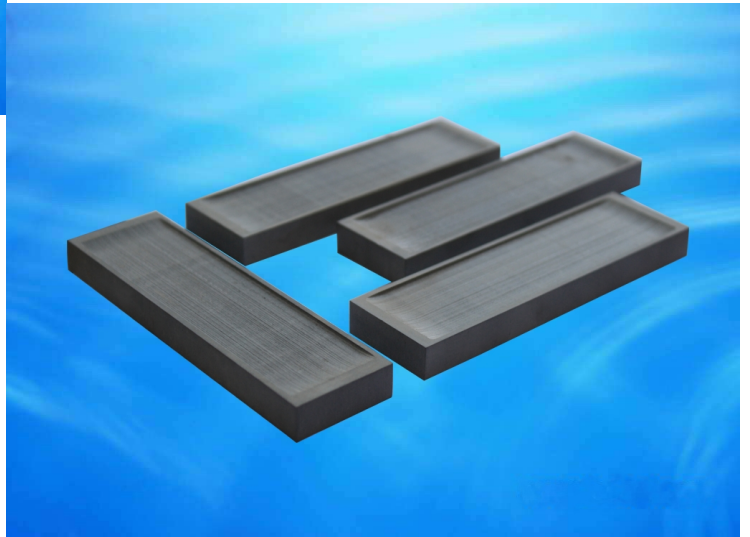
Evaporation Boat



BN products are made of hexagonal boron nitride powder by vacuum hot pressed.

Characteristics:

- Good thermal stability at high temperature
- Good resistance of thermal shock and corrosion
- No wetting by molten metal
- Good insulativity and resistance of breakdown
- Good machinable performance



Technical Data

Density: $>3.01\text{g/cm}^3$
Chemical Composition: TiB₂, BN, AlN
Resistivity(Normal Temperature): $300\text{-}200\mu\Omega\cdot\text{cm}$
Breaking Strength(Normal Temperature): $>150\text{MPa}$
Modulus Of Elasticity: $60\text{-}70\text{Gpa}$
Coefficient Of Thermal Expansion(1450°C): $(4\text{-}6)\cdot 10^{-6}\text{k}$
Specific Heat (700°C): $1.46\text{J/g}\cdot\text{k}$
Heat Conductivity(1450°C) $>100/40\text{W/m}\cdot\text{k}$
Evaporation Rate: $0.4\text{-}0.5\text{g/min}\cdot\text{cm}^2$

Operating Temperature $\leq 1850^\circ\text{C}$
Thermal Conductivity $>100/40\text{W/mk}$

Application:



As melting aluminum and zinc sulfide, using in vacuum evaporation technology.



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Heating Of New Ceramic Sources (Boats)

- a) Ensure all cooper connector clamps are free of aluminum oxide.
- b) Do not remove boats from moisture froof packaging until ready to place between connectors.
- c) Place two pieces of graphite foil on power side of connetor clamp and on piece of graphite foil on wire side of connector. This will make a slight incline of the laid source toward the wire feed side. This provides a flow back of the aluminum puddles preventing overflow on the power side connector.

N.B.: The inclination is for when wire is deposited on the second half side of the source.If wire is deposited in the centre no inclination is necessary.

- d) Apply boron solution (concentrate or 50/50)
- e) Do not place any wire in the new sources prior to first heat up
- f) Input on PLC, the source heating procedure to be in MANUAL mode.
- g) Evacuate chamber to best operating pressure, e. g. 2×10^{-4} mbar

DO NOT TURN ON POWER UNTIL THIS VACUUM LEVEL HAS BEEN ACHIEVED.

Note: This is only for the first heating of new ceramic sources

- h) Connect 3 Voltmeters and 3 Ammeters on 3 external power cables to any three sources being used for reference during heating and process.



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HEATING PROCEDURE - IN MANUAL MODE

- 1 Turn power voltage to 35%. This means potentiometer from 0 - 35%。 This mean: potentiometer from 0 - 35% instantly. Hold for 6 - 8 minutes observing colour to heat when near 30/ 35%. Also, note if there is any vacuum pressure rise.
- 2 After 6 - 8 minutes at 35%, raise power level 7% and 8% alternately, and hold for minutes at each increase.

Example: 35% + 7% = 42% - hold for 3'
 42% + 8% = 50% - hold for 3'
 50% + 7% = 57% - hold for 3'

Continue to normal operating power (70%, 81%, etc.)
- 3 During this power increase, the colour of the heated sources will vary once over 50% of inputted power. This is due to their slight variance in hot resistance created during formulation and mixing (sintering).
- 4 Monitor and note voltage and amperage readings. Cross reference colour versus voltage versus amperage.
- 5 When you have reached white heat (1250 -1400 degrees celsius) adjust individual power, so the colour of each source is very similar to one another. Hold at this point for additional three minutes - observe voltage and amperage.
- 6 Feed wire at 20% rate to wet the source cavity. Gradually increase the wire speed to cover the full cavity - prime coating. THIS IS VERY CRITICAL TO PREVENT EARLY SOURCE FAILURE.
- 7 Observe colour of each source. They will vary and some get more hot than others. This is caused by the aluminum wire which increase the current (amperes). Decrease power as required so all sources have similar colour.
- 8 Increase wire feed rate to achieve operating line speed and deposition.
Example: 110 cm/min - 550m/min - 2.1OD
- 9 Observe and ensure no overflow of aluminum liquid on the sides of the sources.
- 10 When energizing line speed and shutters open the first hour of heat is very critical to the future life of the sources. They are going through a thermal expansion which is difficult by itself. However, the aluminum as a conductive metal requires a path of least resistance. The source resistance will decrease gradually as it ages. Decreasing the voltage in small increase per cycle will balance the flow of current (amperes) versus resistance (ohms).



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HEATING PROCEDURE - IN MANUAL MODE

- 11 Changes in colour during the first 3 - 4 heated cycles (rolls) will occur. Sources with high glow should be decrease both in power and wire feed by 3-5%
- 12 Maintain the operating power (71-82%) for the first four heated cycles. Following the fifth cycle, decrease overall power by 3% at the same time observing the colour of heated source.
- 13 N.B. No matter what the voltmeter or ammeter indicates. The true putput is the colour of the heated source.
- 14 As the boat ages, the resistance will decrease. Therefore, it is important to maintain or slightly reduce the voltage. This will minimize the increase in current (amperes).
- 15 In between cycles ensure all the connector clamps are cleaned if the oxide and re-coted- IF NECESSAYR - with boron.



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