Refactory Metals
for the Power Semiconductor Industry
H.C. Starck has decades of experience in the production of high performance materials that provide solutions to demanding applications in the electronics industry.

Custom-engineered thermal management materials from the Fabricated Products Group of H.C. Starck are helping the electronics industry continue its rapid growth, part of which is driven by increasing miniaturization. This trend puts ever greater cooling demands on electronic circuitries. Our molybdenum and tungsten materials, laminates, and engineered composite materials are uniquely suited for these applications.

The thermal properties of our materials include their low and controlled CTE (coefficient of thermal expansion) and high TC (thermal conductivity), which help remove heat rapidly from high power density devices. Equally important is the expertise of our engineering staff in designing highly engineered materials that match the specific requirements of each application.

Our CuMoCu laminates have an adjustable CTE that could be matched to Si while maintaining high thermal conductivity, which makes them an ideal choice for power devices where considerable heat is generated.

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**Exceptional Properties:**

- Adjustable CTE and TC values
- Suitable for Si-based devices
- Low electrical and thermal resistance
- Moderate thermal conductivity (Mo = 140-150 W/mk)
- Suitable for large area power devices with considerable heat generation
Advancements in electronic controls in high power equipment have resulted in specific demands of the packing materials. Molybdenum and metal-metal matrix composites manufactured by H.C. Starck minimize stress in the package while allowing the electronics to operate in the manner desired.

Molybdenum and tungsten flat parts are widely used as contact materials in:

- Silicon Controlled Rectifiers Diodes
- Transistors
- Thyristors (GTO’s)
- Heat Sink Bases in IC’s, LSI’s and Hybrid Circuits

Value-Added Product Solutions:

- **Discs/Molybdenum**
  - Thickness: 0.1 mm – 6.0+ mm
  - Diameter: 1.0 mm – 150.0 mm*

- **Discs/Tungsten**
  - Thickness: 0.1 mm – 3.0 mm
  - Diameter: 5.0 mm – 60.0 mm*

- **Squares/Molybdenum and Tungsten**
  - Thickness: 0.01 mm – 3.0+ mm
  - Width/Length: 0.50 mm – 200.0 mm*

* depending on thickness

Our photo-chemical etching capabilities allow us to manufacture parts with excellent precision, repeatability, accuracy, and speed. To add value to the machining and fabrication of molybdenum and other refractory metals, we have one of the largest electroplating facilities and electrolytic nickel coatings held to micron thicknesses. Various techniques are available, including PVD for single or double-sided coating, rack or barrel plating enabling complete and comprehensive part size flexibility in addition to volume management capability from a single components to multi-batch.
The conditions of your use and application of our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations, are beyond our control. Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether they are suitable for your intended uses and applications. This application-specific analysis at least must include testing to determine suitability from a technical as well as health, safety, and environmental standpoint. Such testing has not necessarily been done by H.C. Starck. All information is given without warranty or guarantee. It is expressly understood and agreed that the customer assumes and hereby expressly releases H.C. Starck from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance and information. Nothing herein shall be construed as a recommendation to use any product in conflict with patents covering any material or its use. No license is implied or in fact granted under any patent. Properties of the products referred to herein shall, as a general rule, not be classed as information on the properties of the item for sale. In case of order please refer to issue number of the respective product data sheet. All sales and deliveries are based on the latest issue of the product data sheet and the latest version of our General Conditions of Sale and Delivery.

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