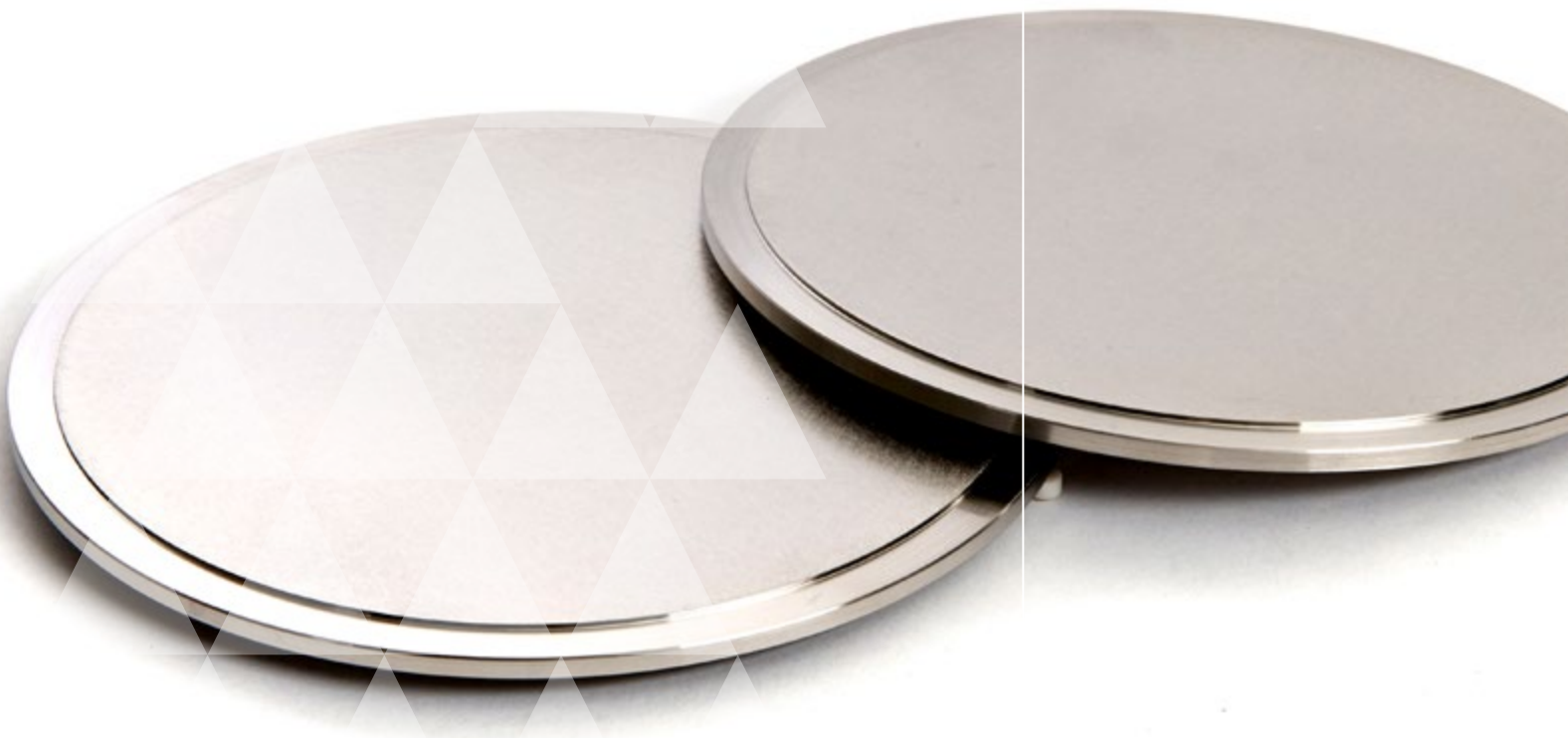




**MATERION**



**ADVANCED MATERIALS**

Magnetic Tunnel  
Junction Materials  
(MTJM)

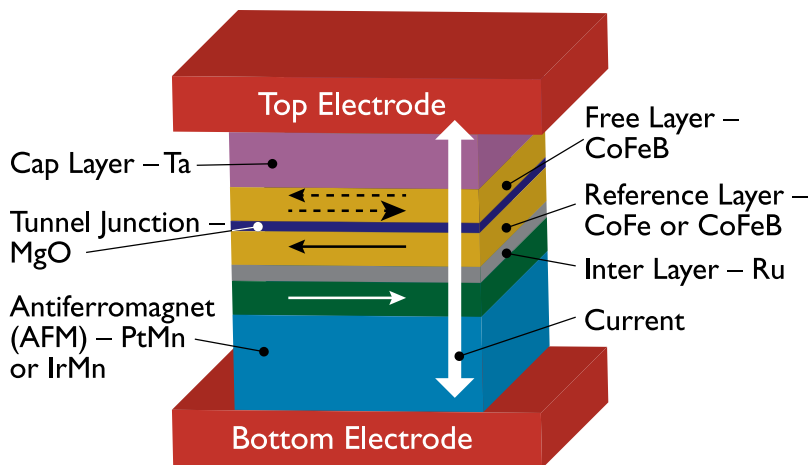
# Magnetic Tunnel Junction Materials

## The Challenge

There is an increased demand for a variety of superior quality magnetic tunnel junction (MTJ) materials to support the expanding market for mass data storage, mobile platforms and other automotive/industrial applications. Since these materials lay the cornerstone for STT-RAM (Spin-Transfer Torque Random-Access Memory) technology, high purity, low oxygen and fine-grain composition is crucial. Some magnetic alloys can be brittle and difficult to work with which is another production challenge. As the Number One global supplier of MTJ materials, Materion manufactures critical components for the advanced memory and data storage industry.

## The Solution

Materion produces the widest possible range of thin film materials for STT-RAM applications. Our advanced vacuum casting technology and high pass-through flux (PTF) manufacturing processes address our customer's requirements for high purity alloys with very low oxygen impurity. Our customized materials options include:



\* Simplified Representation

## BENEFITS

In addition to our unique materials and processes, Materion offers a number of other advantages:

- High purity customizable MTJ materials
- Scalable from R&D to production
- Tight process controls for superior quality control
- Compatible with all standard OEMs
- Technical expertise in developing innovative alloys
- Availability of local service

## SPECIALIZED EXPERTISE

- Long-life, low oxygen magnetic targets
- High purity magnesium
- Precious & valuable metal alloys
- Antiferromagnetic materials
- Full metal management services
- Tailored shield cleaning

## Cast Metals and Alloys

- High PTF Cobalt for higher target utilization
- High purity, low oxygen CoFe & FeCoB alloys
- FeCoB with up to 30% Boron
- Precious Metals and Alloys: Au, Pt, Rh, Ir
- Conflict Free tantalum
- Magnesium of purity > 99.995%
- Titanium, zirconium, tungsten, molybdenum, iron, hafnium

## Powder Metallurgy Materials

- FeCoB alloys with > 30B
- MgO
- Ruthenium
- Rhodium
- Iridium

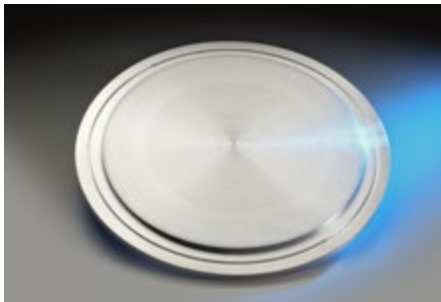
# Materion is committed to partnering with customers to develop the next generation of MTJ material sets.



## COBALT AND CoFe

Produced through Materion's Vacuum Cast Alloy process.

- 99.95% purity available for both Co and CoFe
- 99.99% purity available for Co target
- Co PTF of > 60% for 5 mm thickness
- Equiaxed, uniform and refined grain sizes
- All tool OEM formats available, with customizable designs



## FeCoB

Produced through Materion's Vacuum Cast Alloy or Advanced Powder Metallurgy Methods.

- Demonstrated low particle emissions at high boron levels
- 99.95% purity
- Low oxygen
- Feature size small and designable in powdermet version
- All OEM form factors available and customizable



## MAGNESIUM

Produced through Materion's Powder Metallurgy (99.95% Purity) or Proprietary Casting process (99.995%).

- Higher purity allows predictable deposition
- Cast target density is 100%
- Grains are equiaxed, uniform and refined
- Scalable to any target design



## PRECIOUS METALS

Produced through Vacuum Casting or Powder Metallurgy.

- Au, Ag, Pt, Pd, Ru, Rh, Os, Ir
- Purities up to 5N available for some precious metals
- Lifecycle management available
- Customer specific customized alloys and specially tailored metal management programs available



## SPECIALIZED MATERIALS

Additional customer specific elements and alloys are available.

- This encompasses rare earth elements and customized characteristics of existing materials – including but not limited to – purity, PTF, and impurity control.
- R&D groundwork and applications engineering assistance to support new generation alloys.





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**MATERION ADVANCED MATERIALS** is a global supplier of premier specialty materials and services for the data storage, LED, semiconductor, advanced memory, optical coatings and large area glass markets. We produce precious and non-precious thin film deposition materials, inorganic chemicals, microelectronic packaging products as well as services that include precision parts cleaning and precious & valuable metal reclamation. Because of our industry experts and extensive manufacturing capabilities, we are able to meet our customers' customized material requirements and assist them with innovative Research & Development projects.