



**MATERION**



**ADVANCED  
MATERIALS GROUP**

Materials for Solar  
Energy Applications

# Materials for Solar Energy Applications

## The Challenge

It is critical that materials used for thin film solar applications are of the highest quality. Whether your application is thin film, crystalline silicon, concentrated photovoltaic or concentrated solar power, a high quality material enables reliable device performance and durability. It is also important to select the most appropriate materials to maximize performance of absorber, reflector, antireflective, back contact, buffer, high temperature and TCO thin films.

## The Solution

Materion, now expanded with the addition of Heraeus target materials business, is one of the world's leading producers and developers of materials for thin film technology.

- Broad range of highly engineered precious metal & non-precious metal sputtering targets, ceramic and inorganic compound sputtering targets, evaporation materials and inorganic chemicals
- High purity materials with optimized microstructure for complete coverage
- Materials with consistent quality for extended product life
- Customization capability to match appropriate materials for highest performance

## BENEFITS

Materion offers the convenience of multiple global locations.

- 20+ years of expertise servicing the solar energy market
- Targets for all key layer systems used in photovoltaic applications
- Materials designed for CIGS, CZTS & cadmium telluride (CdTe) technologies for large scale production
- Materials already proven to increase device efficiencies
- Related services such as shield kit cleaning, target bonding and refining & reclaim

## APPLICATIONS

- Thin Film Solar Cells
- Concentrated Photovoltaic (CPV)
- Concentrated Solar Power (CSP)
- N&P Layers
- Back Contact and Interconnects
- Buffer and TCO Layers
- High Temperature Coatings
- Heliostat Reflectors
- Reflective Coatings in Mirrors



# Materion ... Materials to Advance the World's Technologies



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## SPUTTERING TARGETS

### Available Materials

- Precious metal and non-precious metal
- Standard and custom exotic alloys
- Ceramic and inorganic sputtering targets with customized chemistries
- Cadmium containing materials

### Available Forms

- Planar & rotatable targets produced by cast or spray for large area coating
- Custom alloys and compositions
- Multiple shapes & sizes
- Extended life designs

## EVAPORATION MATERIALS

### Shot, wire, rod, pellets, slugs & pieces:

- Precious and non-precious metals & alloys
- Inorganic chemicals
- Customizable purity levels up to 5N
- EVAPro™ high performance metals
- Specialty ceramics
- Custom alloys

## THIN FILM PHOTOVOLTAIC MATERIALS

### Non-precious materials, including but not limited to:

Options for crystalline and amorphous silicon designs:

- Full Alloy CuInGaSe
- Full Alloy CuGa
- Binary and Ternaries
- Transparent Conductive Oxides (TCO), such as Cd<sub>2</sub>SnO<sub>4</sub>
- Indium & Indium Alloys
- Cadmium Sulfide
- Copper & Copper Alloys
- Zinc & Zinc Alloys
- Zinc Telluride
- ZAO
- Tin and Tin Alloys
- Back Contact Metals & Alloys
- Buffer Layer Materials
- Others

## CONCENTRATED PHOTOVOLTAIC (CPV) MATERIALS

### High purity precious metal slugs and/or pellets:

- Gold (Au) metal and alloys
- Silver (Ag) metal and alloys

## CONCENTRATED SOLAR POWER (CSP) MATERIALS

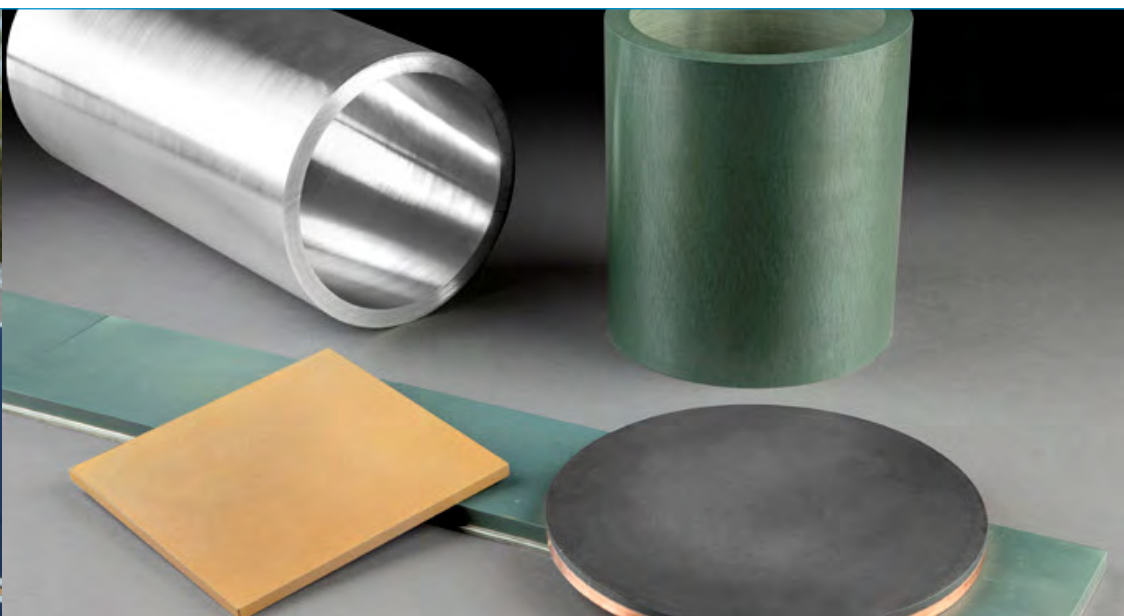
Offerings for heliostat builders employing parabolic & flat reflectors:

- Silver & aluminum source material for single & multilayer reflector technologies
- Durable antireflective materials such as titanium oxides, aluminum oxides, and more

## CONCENTRATED SOLAR POWER (CSP) MATERIALS

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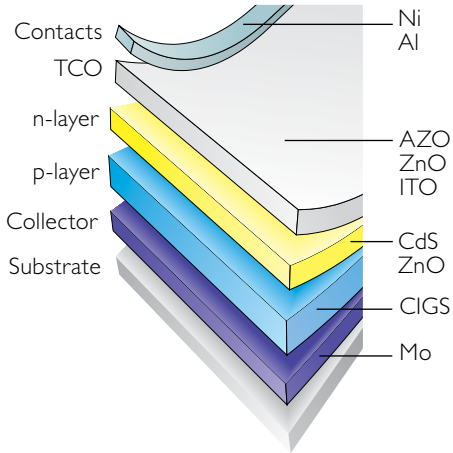
- Silver & aluminum for single and multilayer reflector technologies
- Durable antireflective materials such as titanium oxides, aluminum oxides, and more



## MATERIALS FOR PHOTOVOLTAIC APPLICATIONS

Materion supports the solar industry with a wide variety of specialized materials as well as sputtering targets for all the key layer systems used in photovoltaic applications. Our broad manufacturing capabilities allow us to offer custom materials for Thin Film Solar, Silicon (HJT – Heterojunction Technology) and Compound Semiconductor Based (II-VI and III-V) technologies. As one of the world's leading producers and developers of thin film materials, we anticipate our customers' needs for innovative materials to meet their specific challenges.

### CIGS

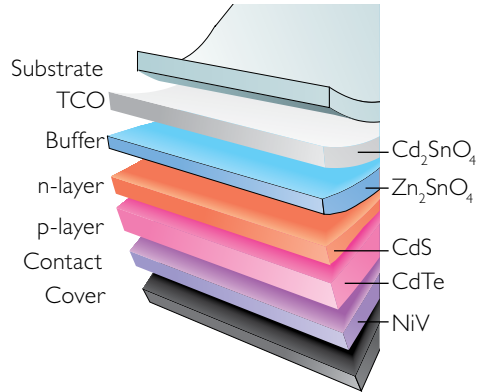


#### CIGS/CIS SOLAR CELL OPTIONS

- CuInGaSe\*
- AZO
- CuGa Alloys
- CuGaSe
- CuGaSe:Na
- Mo
- (ZnMg)O
- In<sub>2</sub>Se<sub>3</sub>
- ZnS
- ITO
- CdS
- NaF
- ZnO
- In<sub>2</sub>S<sub>3</sub>
- CuInSe<sub>2</sub>
- CuSe
- Cu<sub>2</sub>Se
- In
- Si
- ZnAl
- CuIn

\*Materion provides four element CIGS compositions.

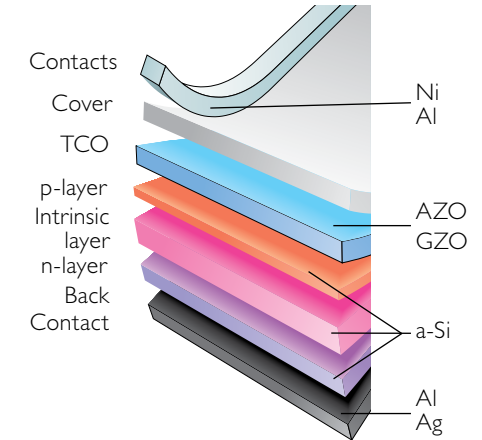
### CdTe



#### CdTe SOLAR CELL OPTIONS

- ZTO
- Ni Alloys
- NiV
- Zn<sub>2</sub>SnO<sub>4</sub>
- Ti
- Cu
- CdZnTe
- Si
- CdTe
- ZnSn
- Cd<sub>2</sub>SnO<sub>4</sub>
- Sb<sub>2</sub>Te<sub>3</sub>
- Al
- Zn
- ZnMg
- SiAl
- CdSn
- CdS
- ZnTe
- Mo
- Cr
- Sn
- ITO
- ZnO

### a-Si & Multi-junction



#### AMORPHOUS-Si & MULTI-JUNCTION SOLAR CELL OPTIONS

- TCO
- Ag Alloys
- NiV
- Si
- ZnO
- Ag
- Al
- Ni
- SiAl
- ITO
- AZO
- GZO
- Ti
- Mo



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**MATERION ADVANCED MATERIALS GROUP** is a manufacturer of specialty materials servicing the global solar market for over twenty years. Our sputtering targets, evaporation materials, and inorganic chemicals are designed for use in thin film crystalline silicon, concentrator photovoltaic and concentrator solar power technologies for a range of solar applications.