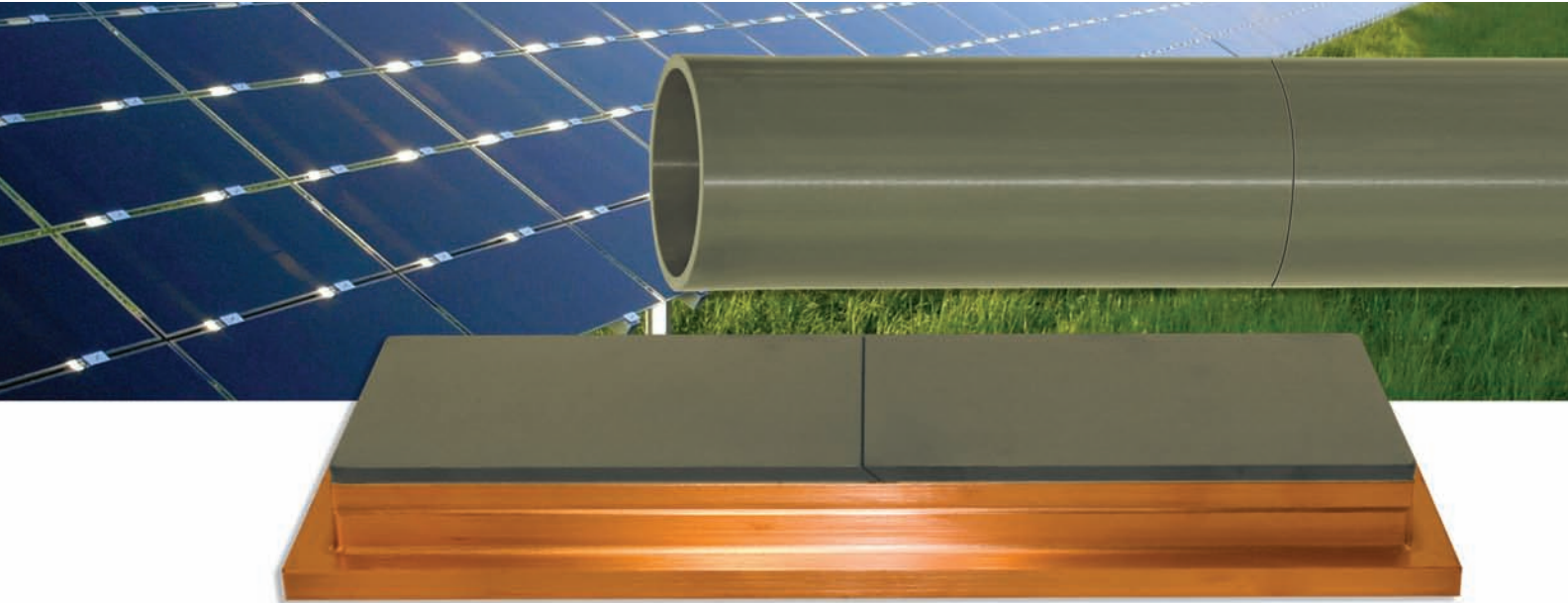


AZO (ZnO:Al₂O₃) Targets

Transparent conductive oxides for photovoltaic devices



Praxair Deposition Materials

Praxair offers deposition materials for physical vapor deposition (PVD). Through customer collaboration, we leverage our engineering expertise to solve the technological challenges of semiconductor and photovoltaic devices. Our growing portfolio of PVD materials includes sources for metal and metal-oxide films. We manufacture planar and rotatable targets for transparent conductive oxides (TCOs).

Praxair is uniquely positioned with a thin-films applications laboratory to advance sputtering technology. The lab includes sputtering tools for demonstrating thin-film deposition and confirming target performance (behavior). Combined with a specialized analytical laboratory, we can expedite the development of new targets, characterize thin-film properties and optimize target performance.

AZO targets have proven to provide highly effective TCO layers in amorphous Silicon (a-Si), Copper Indium Selenide (CIS), and Copper Indium Gallium Selenide (CIGS) and other thin-film photovoltaic devices.

Production Process

High purity metallic oxide powders are engineered to produce dense ceramic targets with homogeneous grain structure for exceptional conductivity. Available shapes include targets, cylinders and tiles. Larger ceramic arrays can be assembled from multiple units. The ceramic deposition materials can be provided with indium solder or elastomer bonding.

Composition

98wt% ZnO : 2wt% Al₂O₃ standard, custom compositions available

Purity

99.99% raw material

Bonding

Indium solder or Elastomer

Handling and Safety

Material safety data sheets (MSDS) sent with first shipment and available upon request.

Packaging

Packing is available to customer's requirements.

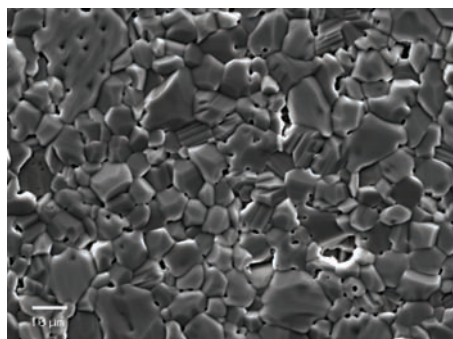
About Praxair

Praxair develops and globally distributes advanced process materials, helping photovoltaic, semiconductor, LED, and TFT-LCD manufacturers lower cost of ownership, improve productivity, enhance technology, and reduce environmental impact by serving as a single, integrated source for a variety of process gases, materials, and related equipment and services.

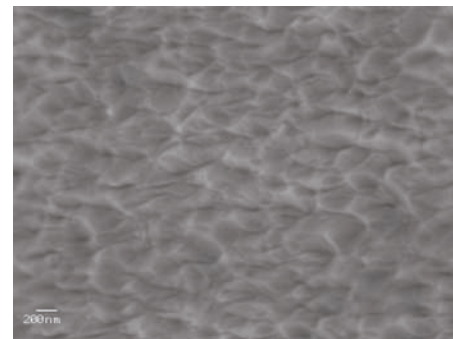
Physical Characteristics			
Property	Typical Value*		
Density	≥ 95%		
Resistivity (bulk)	< 750 μΩ cm		
Avg. Grain Size	< 6 μm		
Thermal Conductivity	33 W m ⁻¹ K ⁻¹		
Thermal Expansion (25-200 °C)	5.36 x 10 ⁻⁶ K ⁻¹		
Appearance	Dark green		
Property	Typical Dimensions**		
Shape	Flat (each tile)	Rotatable (each tube)	Round
Length	290 mm	254 mm	
Width	140 mm		
Diameter			330 mm
OD		163 mm	
Thickness	13 mm	14 mm	13 mm

Tolerances on dimensions ±0.25 mm
 * The data in this table represents typical analysis of standard products. These are not specifications. The data is the most accurate available at the time of publication.
 ** Maximum dimension available at the time of publication. Custom manufacturing of alternative dimensions available upon request.

Properties



Homogeneous grain structure for improved sputtering performance.



SEM of sputtered film at 15000x

Manufacturing sites of Praxair Deposition Materials

Praxair Electronics
 560 Route 303
 Orangeburg, NY 10962-1329
 Tel +1 845 359 4200
 Fax +1 845 359 4200

16130 Wood-Red Road, Suite 7
 Woodinville, WA 98072-6231
 Tel +425 487 1769
 Fax +425 489 1859

Praxair MRC S.A.S.
 66 Boulevard de Thibaud
 BP 1749
 Toulouse Cedex 1, F-31084
 France
 Tel +33 561 435019
 Fax +33 561 435028

Praxair Surface Technologies Co., Ltd.
 Foreign Investors Industry Park
 743, Back Suk Dong
 Chonan City, Republic of Korea
 Tel +82 41 560 2400
 Fax +82 41 564 6619

Sales and Customer Inquiries

USA
Deposition Materials
 Tel +1 800 TARGETS
 Fax +1 800 447 5040
Process Gases
 Tel +1 800 446 8765
 Fax +1 800 447 5040

Europe
Deposition Materials
 Tel +33 561 435019
 Fax +33 561 435028
Process Gases
 Tel +32 14 250 480
 Fax +32 14 250 424

Asia
Sputtering Targets
 Tel +886 3 558 2109
 Fax +886 3 558 4756
Process Gases
 Tel +886 3 554 3538
 Fax +886 3 554 3539
For more information
 e-mail: solar@praxair.com

