LTS Research Laboratories, Inc

HAFNIUM OXIDE

LTS's ultra high purity HfO_2 for optics and microelectronics applications.

Hafnium oxide (HfO_2, hafnia) is a high-index, low-absorption material usable for coatings in the near-UV (below 230 nm) to IR (8,000 nm) regions. Films of hafnium oxide can be used in combination with silicon dioxide layers to form high index-contrast multilayer structures with a high laser damage threshold at 350 nm. The material is supplied in compact form as tablets or a powder with few metallic impurities.

HfO_2 is used in UV laser multilayer coatings, IR mirror coatings, emitter wire coatings, achromatic beam splitting, and protective, polarizing, and dielectric coatings from the UV to medium IR region of spectrum. HfO_2 has excellent adhesion to glass, most other oxides, and to metals such as aluminum and silver, and is also utilized as an abrasion resistant layer for metal mirror surfaces.

The refractive index of the material at 500 nm is 2.0, where it achieves high chemical and mechanical stabilities, extremely low absorption, and diffusion of light.

Deposition:

Our HfO_2 is completely outgassed and requires $^1/_3$ less time in preconditioning for deposition.

During the evaporation process, hafnium oxide is reduced. It is suggested that the material be evaporated in an oxidizing atmosphere to minimize particulate formation during deposition. High energy deposition is also recommended to optimize film packing density.

Variations in the size of hafnium oxide in the deposition chamber influence the preconditioning of the material in e-beam deposition. Deposition should be carried out at a suggested rate of 2-4 $^{Å}/_{sec}$; however, if spattering is absent, the rate can be increased to 4-8 $^{Å}/_{sec}$, resulting in thin films of higher index. Low zirconium content hafnia allows especially hard thin film coatings with ion-assisted deposition.

Film properties can be optimized through a variety of additional pre- and post-deposition techniques.

Product Data:

Available Purity:	**99.99%, 99.995%**
Melting Point:	**2880 °C**
Evaporation Temperature:	**2300-2500 °C**
Density:	**9.68 $^g/_{cc}$**
Transmission Range:	**230 nm - 8,000 nm**

Refractive Index:

230 nm	**2.30**
250 nm	**2.30**
300 nm	**2.10**
500 nm	**2.00**
600 nm	**1.98**
700 nm	**1.98**
900 nm	**1.97**
2,000 nm	**1.94**
8,000 nm	**1.88**

Material Availability:

Pressure sintered pellets
Black or white granules
100-200 mesh powder

LTS RESEARCH LABORATORIES, INC.
37 Ramland Road
Orangeburg, NY 10962

Sales | (800) 709 2808 | +1 845 510 4119 | sales@ltschem.com
Fax | (845) 818 3590

www.ltschem.com