YBC COMPOUNDS

YBC-264 and YBC-375

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YBC DFM®, a brand new compound capable of replacing extremely radioactive Thorium Fluoride in its entirety, is a highly preferred low index material transparent from the UV to IR region of the spectrum.

YBC-264 is recommended for single layer coatings and **YBC-375** for multilayer coatings. Evaporated films are very durable, chemically stable, and exhibit low stress in thicknesses up to 1900 nm. **YBC-264** is recommended for AR coatings in the 200 to 14,000 nm region, including high power CO_2 laser coatings. However, **YBC-375** is also usable in UV applications.

YBC is a non-radioactive material and does not require special handling.

Purity: 99.995 %

Impurity Profile in ppm

Fe:<3	Cu:<1	Mn:<1	Ti:<2	Ni:<1	V:<1	Mo:<1	Al:<3	Co:<2	Nb:<2	Cr:<2	Pb:<2	Si:<5

Refractive index	1.51 at 500 nm
Transparency range	200 – 14,000 nm
Melting point	1,382 °C
Evaporation Temperature	1,300-1,420 °C
Density	4.45 g/cc
Solubility	Insoluble in water
	Slightly soluble in dilute acids
Abrasion	moderately dense
Humidity	mildly hygroscopic

PROPERTIES OF THE THIN FILM

Transparency Range	200-14,000 nm
Refractive Index	
at 220 nm	1.55
at 550 nm	1.51
at 1,000 nm	1.4
at 8,000 nm	1.37
at 10,000 nm	1.32
at 12,000 nm	1.30

Availability:

- **3~ 4 g, 6-8 x 10 mm melted pellet**
- **1-4 mm granules**
- **<-100 mesh powder**

Deposition Suggestions:

The suggested evaporation temperature of YBC is 1250-1500 °C. E-beam or resistance-heated sources can be used. For E-beam evaporation, molybdenum, tantalum, or platinum boats are suggested. The recommended substrate temperature is 100-300 °C, with a chamber pressure less than $1*10^{-5}$ mbar at an evaporation rate of 1.5 - 2 nm/sec. Since YBC is DFM® grade material, no outgassing occurs, and deposition can therefore be made at a higher rate.

Optical Properties:

The transparency range of the compound is 200 - 14,000 nm. The refractive index in the visible (500 nm) spectrum is 1.51. At 10,000 nm, the index is 1.33.

Applications in Multilayer Coatings:

YBC is recommended as a component in multilayer coatings for AR, bandpass, and dichroic filters. YBC exhibits low stress and good adhesion to ZnS, ZnSe, Ge, and many fluoride compounds. The microstructure of the deposited coating is amorphous, and the films are relatively soft.

Material Design, Purity, and Advantages:

YBC compounds are produced through DFM® in a controlled, fluoride-based atmosphere. X-ray diffraction analysis then identifies the high purity YBC compounds. The specification table shows the typical spectrographic analysis results of YBC. Since YBC is non-radioactive, it does not require special environmental safeguards like Thorium fluoride does. Thus, the material is very safe to use.

Chemical Analysis:

Available upon request

RECOMMENDED EVAPORATION TECHNIQUES			
RESISTANCE EVAPORATION			
Source	**Molybdenum or Platinum or Tantalum boat**		
Evaporation Temperature	**1100° C**		
Substrate temperature	**150-280 ° C**		
Pressure	**< 1.10^{-5} mbar**		
Evaporation rate	**1.5 - 2 nm/sec**		
ELECTRON-BEAM EVAPORATION			
Evaporator	**Leybold A 700 Q E-beam Evaporator ESV 6, 8 Kv**		
	Acceleration Voltage, liquid nitrogen cooled baffle		
Evaporation Temperature	**1300 – 1420 ° C**		
Substrate Temperature	**150 - 280° C**		
Pressure	**< 5.10^{-5} mbar**		
Deposition rate	**1.5 - 2 nm/sec**		
Transparency Range	**200 – 14,000 nm**		
Refractive Index:		Scatter: **very low**	
At 220 nm	**1.55**	Adhesion and Stress Thickness Threshold: **2,000 nm (ZnS)**	
At 550 nm	**1.51**		
At 8,000 nm	**1.37**	Absorption at 10,600 nm for QW (%): **0.11**	
At 10,600 nm	**1.32**	Loss of Transmission (%) at 12,000 nm: **<2.5**	

Newer Chemicals for Opto-Electronics Industry

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