

FUV coatings based on AlF3 films

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Transparent coating materials are required for all sorts of optical applications. Few materials extend their transparency to the far ultraviolet (FUV, $\lambda < 200$ nm): only some metal fluorides and few metal oxides. MgF2 and LiF are the overwhelmingly used film materials due to their short FUV cutoff wavelength at which they turn from transparent to absorbing. AlF3, with its cutoff at ~ 113 nm, has become a third material option. Yet, little information has been reported so far on AlF3-based coatings, particularly when compared with MgF2-based ones.

At GOLD, we have been working with AlF3 films deposited by evaporation as a candidate material for various sorts of coatings for the FUV:

- As a protective coating for Al broadband mirrors.
- In narrowband multilayer mirrors that alternate AlF3 films with a material with contrasting refractive index: LaF3.
- In ultra-narrowband multilayer mirrors that alternate AlF3 with MgF2 films.
- In (Al/AlF3) multilayers that operate as linear polarizers.

The optical constants (n and k) of AlF3 were previously measured in an extended range that included the FUV. k of AlF3 in the FUV was measured with a new procedure that was developed at GOLD.

In the presentation, we will display n, k of AlF3 along with our main results on FUV coatings based on AlF3 films.