

Dr. Mark Schürmann (Fraunhofer IOF)

Venue:

Monday 27th July 2015, Telescopium Auditorium

Title of talk:

Protected silver coatings for astronomical and space applications

Abstract:

Thin film coatings are indispensable in order to manufacture mirrors with highest possible reflectivity. The maximum reflectivity can be achieved by all-dielectric coatings; however, the spectral bandwidth of these mirrors is limited. Metal based coatings (Al, Au, Ag) are applied, as they allow for a high reflectivity and at the same time a broad spectral bandwidth. Of all metals, Ag provides the highest reflectivity from VIS to IR. Because of the high reflectivity, mirrors with Ag-coatings are the first choice for many applications. This is especially true for optical devices where a multi-reflection is necessary.

Silver is a noble metal. However, corrosion activators (S and Cl) in combination with water/humidity can lead to corrosion. During aging, corrosion products like Ag_2S and AgCl are formed and reduce the reflectivity. Thus, a protective layer is required to prevent the corrosion and sustain the high reflectivity of the mirror. A protective layer on the mirror front-side influences the optical properties. Therefore transparent dielectric materials like oxides, nitrides or fluorides are commonly applied as protective layers. Unfortunately, at harsh environmental conditions, damage of the Ag-coating can occur even in the case of protected-Ag.

In this presentation

- possible damage mechanisms to protected Ag coatings
- test methods concerning these damage and
- approaches to prevent these damages and increase the environmental stability

will be discussed.

Short CV:

Dr. Mark Schürmann. PhD in Physic at the university of Dortmund in 2005. Since 2007 at the optical coatings department at Fraunhofer-Institute for Applied Optics and Precision Engineering (IOF) in Jena (Germany). Since 2013 group manager for the group dealing with coatings for precision optics. Special interests: Magnetron sputtering of dielectric and metal-dielectric optical coatings, coatings for astro- and space-optics.