INTRODUCTION

Reactive magnetron sputter technologies are a powerful tool for coating precision optical elements. The technology is based on the deposition of thin films by the sputtering of a target in a reactive gas atmosphere. The resulting films have a high degree of control over refractive index, optical absorption, and mechanical properties. This allows for the manufacturing of highly precise optical coatings with defined optical properties.

CHARACTERISTICS OF FUSE MAGNETRON SPUTTER PROCESS

- simultaneous coating for single and multilayer, ternary compounds and gradient layer with Double Ring Magnetron (DRM)
- environmental stability of dielectric optical filters
- fluoride coatings
- precision optical filters: example bandpass filter
- COATING HARDWARE AND TECHNOLOGY
- results and examples of application
- SUMMARY
- ACKNOWLEDGEMENT
- CONSPONSORS

RESULTS AND EXAMPLES OF APPLICATION

Single and multi-band narrow filters

Very low roughness by acquired lenses and polarimetric properties

Broadband and adjustable film

Precision optical filters example hardband filter

Broadband and adjustable film

Double Ring Magnetron (DRM)

Stationary deposition of single and multilayer, ternary compounds and gradient layer with Double Ring Magnetron (DRM)

Unipolar/Bipolar Pulse Magnetron Sputter System PMS 1000 of Fraunhofer FEP for precision in-line coating

Magnetron (DRM)

Self-sufficient system

Unipolar/Bipolar Pulse Magnetron Sputter System PMS 1000 RM-type magnetrons:

- automatically with 4 DRM stations in one chamber
- superposition of film thickness distributions of two concentric discharges
- without interruption of plasma process at one coating station
- by power matching of Double Ring Magnetron discharges

Environmental stability of dielectric optical filters

Films show high refractive index and very low roughness

Precision optical filters: example bandpass filter

Structure and roughness of the filter, wavelength [nm], fluorescence analysis, Zero-reflection UV to NIR, e.g.: cut, narrow band, single band rugate filter

Single Band Ruggate Filter (enlarged detail; prepared by FIB technique)

Comparison of laser induced damage threshold (LIDT) of HR 1064 nm, SiO2, MgF2, and Si3N4 HR, performance metrics: incident laser wavelengths 1064 nm, 532 nm, and 355 nm

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