

9-1988

Thin-film devices for polarized light- introduction

R. M.A. Azzam

University of New Orleans, razzam@uno.edu

William H. Southwell

Follow this and additional works at: https://scholarworks.uno.edu/ee_facpubs



Part of the [Electrical and Electronics Commons](#), and the [Optics Commons](#)

Recommended Citation

R. M. A. Azzam and William H. Southwell, "Thin-film devices for polarized light," *J. Opt. Soc. Am. A* 5, 1530- (1988)

This Article is brought to you for free and open access by the Department of Electrical Engineering at ScholarWorks@UNO. It has been accepted for inclusion in Electrical Engineering Faculty Publications by an authorized administrator of ScholarWorks@UNO. For more information, please contact scholarworks@uno.edu.

INTRODUCTION

It is a pleasure to introduce this feature issue on thin-film optical devices for polarized light. The papers that appear in this issue come from some of the more active areas of research in this field. Important issues related to the interaction of optical wave fields with multilayer thin films for magneto-optical recording are considered in the first two papers. Gamble and Lissberger discuss the electric field amplitude distribution in the multilayer and its relevance to absorption, interfacial scattering, and signal-to-noise ratio; Li and Parsons examine the reflection of a strongly focused beam from the magneto-optic multilayer by using the Fourier-transform technique. Form birefringence associated with the anisotropic microstructure of vapor-deposited thin films is analyzed by Abeysuriya and Hodgkinson, using a plate-void mode. If this property is controlled as to its magnitude and the direction of its principal axes, it can be used in the design of novel thin-film devices, as these authors suggest. Wöhler *et al.* take Berreman's 4×4 matrix method a significant step forward by using the theorem of Cayley and Hamilton to simplify the calculation of the transfer matrix of a uniaxial layer. This makes possible the implementation of Berreman's widely accepted method on a personal computer. Rugate filters are the focus of intense current interest, and Southwell derives a closed-form solution for the reflection coefficients of these sinusoidal-index devices for *p*- and *s*-polarized light. Weis and Gaylord extend their recently developed concept of an electro-optically tunable narrow-band Fabry-Perot/Solc filter to include distributed Bragg reflectors as the narrow-band end reflectors. Designed filters with an effective finesse of >5000 are reported.

Haas *et al.* use the 4×4 matrix method to model dichroic polarizers, including the effects of nonnormal incidence, and also present a method for determining the complex principal refractive indices of a dichroic medium from measured transmittances. Azzam generalizes his earlier work, on the division-of-wave-front thin-film beam splitter that generates spatial binary patterns of orthogonal linear and circular states, to the case in which the reflected polarizations are orthogonal elliptical states. Finally, Jestl *et al.* describe their interesting work on polarization- and wavelength-selective photodetectors that use a sinusoidally corrugated semiconductor substrate overcoated with a metal-dielectric thin-film bilayer. To the authors and referees of this special issue we extend our sincere thanks. We are also grateful to Catherine Barrett and Jane Lockwood for their assistance in preparing this feature and to Harry Barrett, the editor, for his support.

R. M.A. Azzam
W. H. Southwell
Feature Editors

THIN-FILM OPTICAL DEVICES FOR POLARIZED LIGHT

MAGNETO-OPTICS

- Electromagnetic field distributions in multilayer thin films for magneto-optical recording R. Gamble, P. H. Lissberger 1533
- Reflection of strongly focused light beams from magneto-optic multilayer films Z.-M. Li, R. R. Parsons 1543

BIREFRINGENT FILMS

- Plate-void model for thin-film form birefringence Kumudini Abeysuriya, Ian J. Hodgkinson 1549
- Faster 4×4 matrix method for uniaxial inhomogeneous media H. Wöhler, G. Haas, M. Fritsch, D. A. Mlynski 1554

RUGATE FILTERS

- Spectral response calculations of rugate filters using coupled-wave theory W. H. Southwell 1558

TUNABLE FILTERS

- Fabry-Perot/Solc filter with distributed Bragg reflectors: a narrow-band electro-optically tunable spectral filter R. S. Weis, T. K. Gaylord 1565

POLARIZING ELEMENTS

- Polarizer model for liquid-crystal devices G. Haas, H. Wöhler, M. Fritsch, D. A. Mlynski 1571
- Division-of-wave-front thin-film beam splitter for generating binary patterns of orthogonal elliptical polarization states R. M. A. Azzam 1576

ANISOTROPIC DETECTORS

- Polarization- and wavelength-selective photodetectors M. Jestl, A. Köck, W. Beinstringl, E. Gornik 1581

BIOGRAPHIES

1585

