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# United States Patent [19]

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## [54] BROADBAND SPECTROSCOPIC ROTATING COMPENSATOR ELLIPSOMETER

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### Related U.S. Application Data

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[51] Int. Cl.<sup>6</sup> ..... **G01J 4/00**; G02F 1/01

[52] U.S. Cl. .... **356/369**; 356/364; 250/225

[58] Field of Search ..... 356/364, 365, 356/366, 367, 368, 369; 250/225

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### [57] ABSTRACT

An ellipsometer, and a method of ellipsometry, for analyzing a sample using a broad range of wavelengths, includes a light source for generating a beam of polychromatic light having a range of wavelengths of light for interacting with the sample. A polarizer polarizes the light beam before the light beam interacts with the sample. A rotating compensator induces phase retardations of a polarization state of the light beam wherein the range of wavelengths and the compensator are selected such that at least a first phase retardation value is induced that is within a primary range of effective retardations of substantially 135° to 225°, and at least a second phase retardation value is induced that is outside of the primary range. An analyzer interacts with the light beam after the light beam interacts with the sample. A detector measures the intensity of light after interacting with the analyzer as a function of compensator angle and of wavelength, preferably at all wavelengths simultaneously. A processor determines the polarization state of the beam as it impinges the analyzer from the light intensities measured by the detector.

26 Claims, 5 Drawing Sheets

