US 20040012853A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2004/0012853 A1

Garcia et al. (43) Pub. Date: Jan. 22, 2004

(54) METHOD AND APPARATUS FOR IMAGING USING POLARIMETRY AND MATRIX BASED IMAGE RECONSTRUCTION

(76) Inventors: **Juan Manuel Bueno Garcia**, Murcia (ES); **Melanie C.W. Campbell**, Waterloo (CA)

Correspondence Address:
DOWELL & DOWELL PC
SUITE 309
1215 JEFFERSON DAVIS HIGHWAY
ARLINGTON, VA 22202

(21) Appl. No.: **10/436,365**

(22) Filed: **May 13, 2003**

Related U.S. Application Data

(60) Provisional application No. 60/379,417, filed on May 13, 2002. Provisional application No. 60/417,641, filed on Oct. 11, 2002.

Publication Classification

(51) **Int. Cl.**[7] **G02B 5/30**; G02B 27/28

(52) **U.S. Cl.** **359/485**

(57) **ABSTRACT**

The present invention provides a method and apparatus for improving the signal to noise ratio, the contrast and the resolution in images recorded using an optical imaging system which produces a spatially resolved image. The method is based on the incorporation of a polarimeter into the setup and polarization calculations to produce better images. After calculating the spatially resolved Mueller matrix of a sample, images for incident light with different states of polarization were reconstructed. In a shorter method, only a polarization generator is used and the first row of the Mueller matrix is calculated. In each method, both the best and the worst images were computed. In both reflection and transmission microscope and Macroscope and ophthalmoscope modes, the best images are better than any of the original images recorded. In contrast, the worst images are poorer. This technique is useful in different fields such as confocal microscopy, Macroscopy and retinal imaging.