Special Section On Polarized Light For Biomedical Applications

Mueller-matrix of laser-induced autofluorescence of polycrystalline films of dried peritoneal fluid in diagnostics of endometriosis

Yuriy A. Ushenko ; *Galina D. Koval* ; *Alexander G. Ushenko* ; *Olexander V. Dubolazov* ; *Vladimir A. Ushenko* ; *Olga Yu. Novakovskaia*

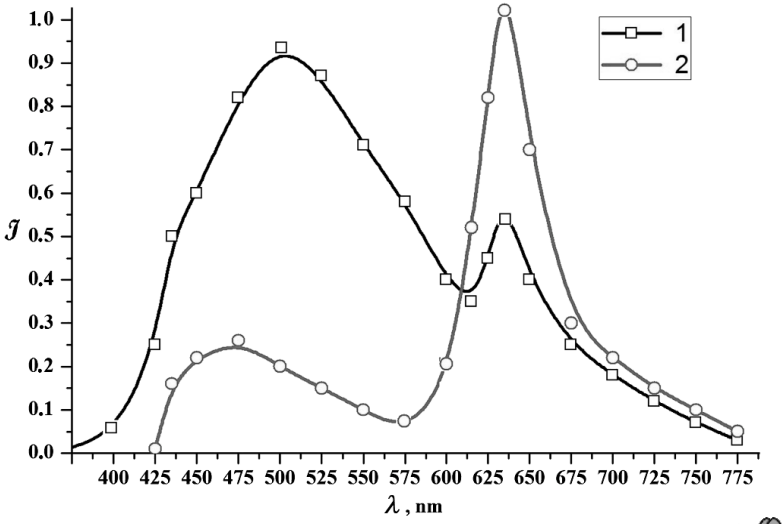
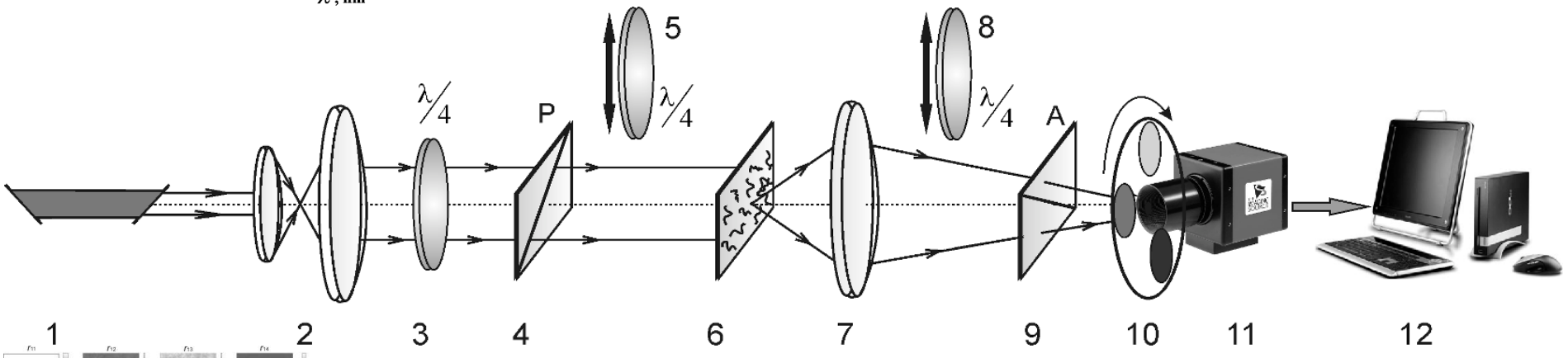
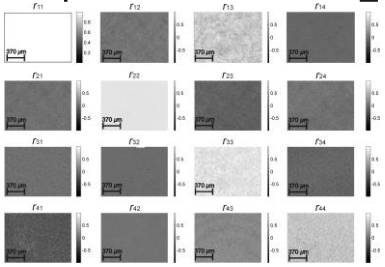
[+] Author Affiliations

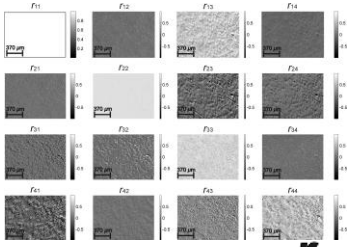
J. Biomed. Opt. 21(7), 071116 (May 18, 2016). doi:10.1117/1.JBO.21.7.071116

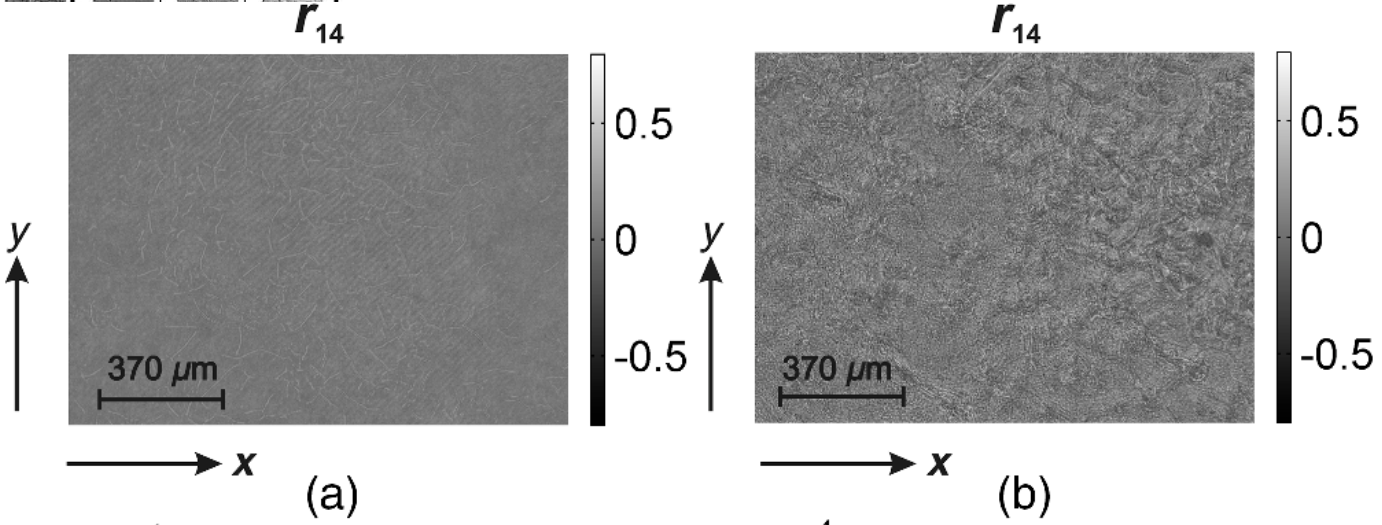
History: Received October 2, 2015; Accepted April 18, 2016

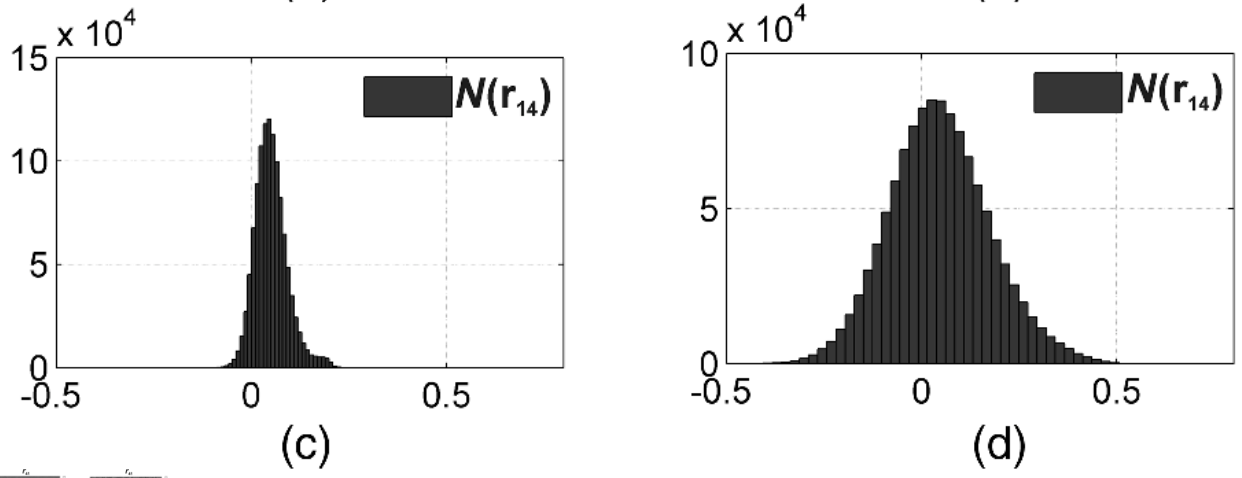
Abstract

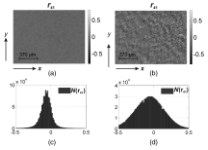
Abstract. This research presents investigation results of the diagnostic efficiency of an azimuthally stable Mueller-matrix method of analysis of laser autofluorescence of polycrystalline films of dried uterine cavity peritoneal fluid. A model of the generalized optical anisotropy of films of dried peritoneal fluid is proposed in order to define the processes of laser autofluorescence. The influence of complex mechanisms of both phase (linear and circular birefringence) and amplitude (linear and circular dichroism) anisotropies is taken into consideration. The interconnections between the azimuthally stable Mueller-matrix elements characterizing laser autofluorescence and different mechanisms of optical anisotropy are determined. The statistical analysis of coordinate distributions of such Mueller-matrix rotation invariants is proposed. Thereupon the quantitative criteria (statistic moments of the first to the fourth order) of differentiation of polycrystalline films of dried peritoneal fluid, group 1 (healthy donors) and group 2 (uterus endometriosis patients), are determined.

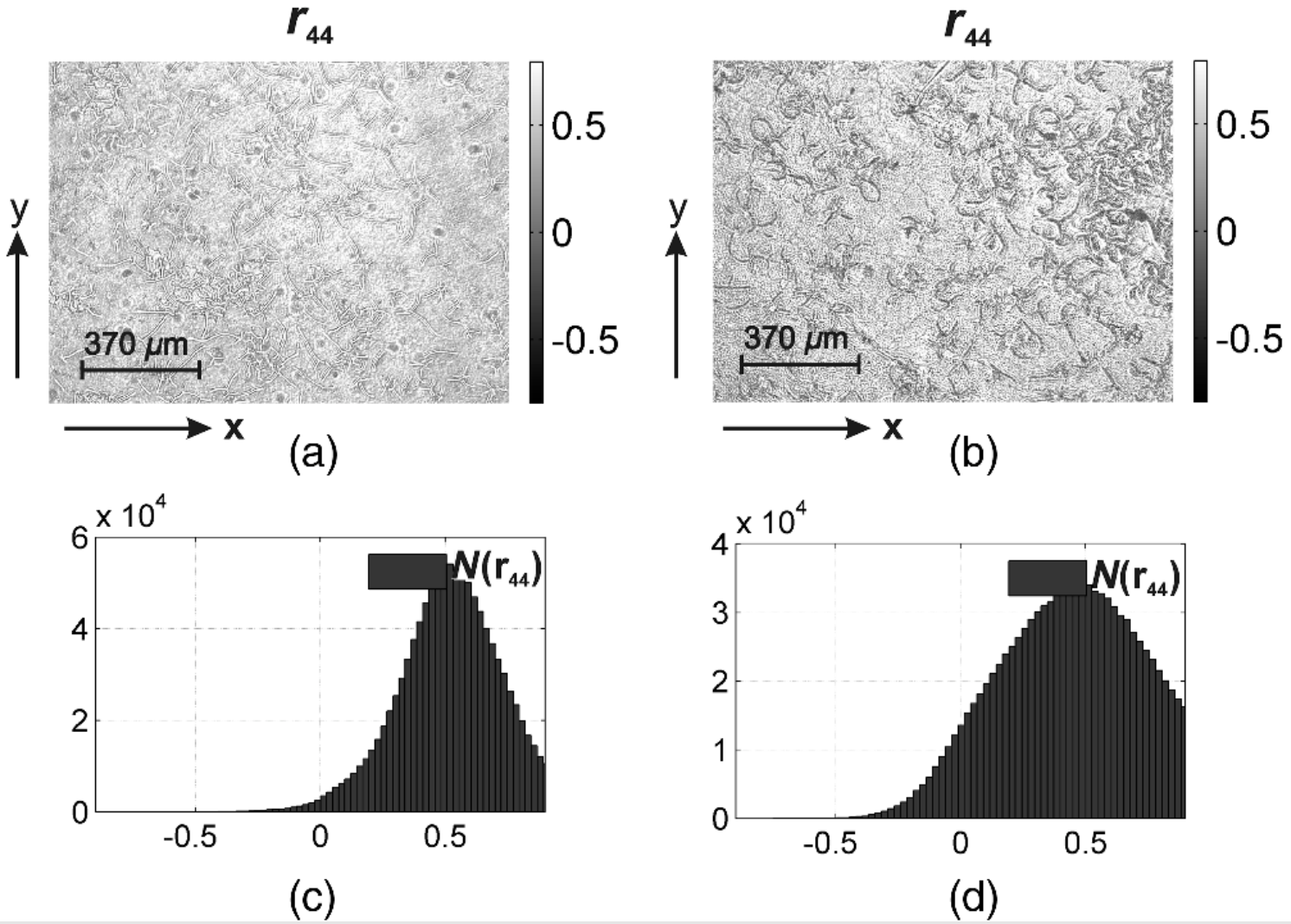
- 
1
2
$\mathcal{I}$
λ , nm
- 
λ/4
P
5
λ/4
8
λ/4
A
1
2
3
4
6
7
9
10
11
12
- 




r14
0.5
0
-0.5
y
370 μm
x
(a)
r14
0.5
0
-0.5
y
370 μm
x
(b)


x 10^4
15
10
5
0
N(r14)
-0.5
0
0.5
(c)
x 10^4
10
5
0
N(r14)
-0.5
0
0.5
(d)





- Figures in this Article

Topics

Lasers ; Mueller matrices ; Luminescence ; Diagnostics