## PROCEEDINGS OF SPIE

## Fifteenth International Conference on Correlation Optics

Oleg V. Angelsky Editor

13–16 September 2021 Chernivtsi, Ukraine

Organized by Chernivtsi National University (Ukraine)

Co-organized by Research Institute of Zhejiang University-Taizhou (China)

Sponsored by ICO – International Commission for Optics Optica (formerly OSA), the Society Advancing Optics and Photonics Worldwide Frontiers in Physics LTD LTD "ROMA" SKB "ELEKTRONMASH" (Ukraine) Private Clinic of Eye Microsurgery "Your Vision" (Ukraine) ARTON Company (Ukraine)

Co-sponsored by SPIE

Published by SPIE

Volume 12126

Proceedings of SPIE 0277-786X, V. 12126

SPIE is an international society advancing an interdisciplinary approach to the science and application of light.

The papers in this volume were part of the technical conference cited on the cover and title page. Papers were selected and subject to review by the editors and conference program committee. Some conference presentations may not be available for publication. Additional papers and presentation recordings may be available online in the SPIE Digital Library at SPIEDigitalLibrary.org.

The papers reflect the work and thoughts of the authors and are published herein as submitted. The publisher is not responsible for the validity of the information or for any outcomes resulting from reliance thereon.

Please use the following format to cite material from these proceedings: Author(s), "Title of Paper," in Fifteenth International Conference on Correlation Optics, edited by Oleg V. Angelsky, Proc. of SPIE 12126, Seven-digit Article CID Number (DD/MM/YYYY); (DOI URL).

ISSN: 0277-786X ISSN: 1996-756X (electronic)

ISBN: 9781510651289 ISBN: 9781510651296 (electronic)

Published by **SPIE** P.O. Box 10, Bellingham, Washington 98227-0010 USA Telephone +1 360 676 3290 (Pacific Time) SPIE.org Copyright © 2021 Society of Photo-Optical Instrumentation Engineers (SPIE).

Copying of material in this book for internal or personal use, or for the internal or personal use of specific clients, beyond the fair use provisions granted by the U.S. Copyright Law is authorized by SPIE subject to payment of fees. To obtain permission to use and share articles in this volume, visit Copyright Clearance Center at copyright.com. Other copying for republication, resale, advertising or promotion, or any form of systematic or multiple reproduction of any material in this book is prohibited except with permission in writing from the publisher.

Printed in the United States of America by Curran Associates, Inc., under license from SPIE.

Publication of record for individual papers is online in the SPIE Digital Library.



**Paper Numbering:** A unique citation identifier (CID) number is assigned to each article in the Proceedings of SPIE at the time of publication. Utilization of CIDs allows articles to be fully citable as soon as they are published online, and connects the same identifier to all online and print versions of the publication. SPIE uses a seven-digit CID article numbering system structured as follows:

• The first five digits correspond to the SPIE volume number.

• The last two digits indicate publication order within the volume using a Base 36 numbering system employing both numerals and letters. These two-number sets start with 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 0A, 0B ... 0Z, followed by 10-1Z, 20-2Z, etc. The CID Number appears on each page of the manuscript.

## Contents

## FIFTEENTH INTERNATIONAL CONFERENCE ON CORRELATION OPTICS

12126 02	Influence varnish on color indicator of the imprints [12126-2]
12126 03	Optical absorption, photoionization and binding energy of shallow donor impurity in spherical multilayered quantum dot [12126-3]
12126 04	Analysis, computer modelling and LED visualization of the new modified nonlinear logistic map [12126-4]
12126 05	Auxetic properties of silicon dioxide single crystals [12126-6]
12126 06	Simple optoelectronic chaotic generator: computer simulation and practical realization [12126-7]
12126 07	Charge inversion of polarization correlation vortex [12126-8]
12126 08	Tunable microscopy illuminator by using polymer dispersed liquid crystals [12126-9]
12126 09	Polymer-dispersed liquid crystals forming tunable microlens [12126-10]
12126 0A	Deep learning assisted OAM modes demultiplexing [12126-11]
12126 OB	Effect of annealing on electrical and optical properties of TiN thin films [12126-12]
12126 OC	Simulation of a photonic hook using a trapezoidal prism [12126-13]
12126 0D	Formation a photonic zigzag by a half cylinder [12126-14]
12126 OE	Transmission of phase informative optical signal through the optically inhomogeneous medium [12126-15]
12126 OF	Correlation-optics approach for holographic associative memories problem [12126-16]
12126 0G	Thermal image for monitoring crack forming process (Invited Paper) [12126-17]
12126 OH	Evaluation of the contribution of higher-order electron-nuclear interactions to the NQR frequencies using <sup>115</sup> In spectra in InSe [12126-18]
12126 01	Optical bandgaps, level crossings and Berry phase in a rotating Sagnac interferometer [12126-19]

12126 OJ	Ellipse field to vector field singularities through diffraction [12126-20]
12126 OK	Crystal defects and charge collection in CdTe-based x- and gamma-ray detectors [12126-22]
12126 OL	Statistics of random optical field generated by a random walk with a finite number of steps [12126-23]
12126 OM	Modeling of optical forces in a speckle field [12126-24]
12126 ON	Visualizing probability density distribution of polarization speckle with electron cloud diagrams [12126-26]
12126 00	Algorithmic processing and image control of retinal pathologies [12126-27]
12126 OP	Spectrophotometry of native cytological smears from the cervix in cervical cancer screening [12126-28]
12126 0Q	Polarimetric differential diagnosis of sexually transmitted inflammatory processes of the cervix [12126-29]
12126 OR	Chaotic Lorenz system: analysis of the main information properties, circuit realization and LED visualization using Arduino [12126-30]
12126 OS	New methods for measuring of surface landscape [12126-31]
12126 OT	Stabilization of imprint's optical parameters in offset printing [12126-32]
12126 OU	Involvement of optical methods for condition assessment of cyanobacteria cells under the action of TiO <sub>2</sub> [12126-33]
12126 OV	Formation of polychromatic edge dislocation [12126-39]
12126 OW	Mass-spectrometric surface analysis of the offset rubber blanket [12126-40]
12126 OX	The spectral characteristics of biologically safe banknotes imprints varnished with addition of nanosized silver particles [12126-41]
12126 OY	Influence of electric field on electronic optical quantum transitions in a quantum dot: quantum ring semiconductor nanostructure [12126-42]
12126 OZ	Simulation of wavefront shaping through scattering media [12126-43]
12126 10	The reflectance spectra of the model printing inks [12126-44]
12126 11	Control of microbubbles in water [12126-45]
12126 12	Revealing a scattering object from the spatial distribution of phase singularities in a speckle field [12126-46]

- 1212613 Correlation-optical method for determining the localization of phase singularities in a scattered field [12126-47]
- 12126 14 Performance of CdTe-based p-n junction-diode X/γ-ray detectors [12126-49]
- 1212615 Influence of helicon discharge treatment on ensuring adhesive strength of protective PVD coating CrN on brass-based forms of intaglio printing [12126-50]
- 12126 16 Triangular optical system of precise positioning of the ground robotic complex [12126-51]
- 12126 17 Analysis of the parts' roughness parameters of high-speed printing equipment by optical profilometry [12126-52]
- 12126 18 Optical methods for assessing the effect of DON-1R on the histological structure of fish liver [12126-53]
- 12126 19 Single photon detector on avalanche photodiode [12126-54]
- 12126 1A Dynamics of carbon nanoparticles distribution in reconstruction of optical field [12126-55]
- 12126 1B Gram-Charlier distribution in statistical problems of optics [12126-56]
- 12126 1C Optical methods development for banknote deterioration evaluation [12126-57]
- 12126 1D Optical microscope with spatially structured waveplate (Invited Paper) [12126-58]
- 12126 1E Computer system for increasing the local contrast of railway transport images [12126-59]
- 12126 1F Features of the use of polarized radiation to assess the structural organization of light-scattering objects [12126-60]
- 12126 1G Features of the scattering of polarized light by biological materials of fish [12126-61]
- 12126 1H Fabrication and investigation photosensitive of Graphite/PEDOT:PSS/n-CdZnTe organicinorganic heterojunction [12126-62]
- 12126 11 Fabrication and investigation of graphite/p-InP Schottky-type heterojunction [12126-63]
- 12126 1J X-ray investigations of structure of thick YIG epitaxial systems of different growth parameters [12126-64]
- 12126 1K Influence of defect structure on characteristics of X- and γ-radiation detectors based on CdTe:Cl according to high-resolution X-ray diffractometry [12126-65]
- 12126 1L X-ray diffraction and scanning electron microscopy of concrete composites of high structural strength and density [12126-66]

12126 1M	Fourier energy analysis of Kikuchi patterns for investigation of defect system of diamond crystals [12126-67]
12126 1N	Stabilizing effect of random phase diffuser against wavefront distortions to the intensity distribution formed by Fourier hologram [12126-70]
12126 10	Registration of three-dimensional holograms based on microsystems "Core CaF2 –Shell AgBr" [12126-71]
12126 1P	Extraordinary transverse spin: hidden vorticity of the energy flow and momentum distributions in propagating light fields [12126-72]
12126 1Q	Energy and momentum of the surface plasmon-polariton supported by a thin metal film [12126-73]
12126 1R	Optical control of colour deviation due to ink showing through on the banknote reverse on multitoned watermarks [12126-74]
12126 15	Electrical properties of photosensitive ZnO/Si heterostructure depending on temperature [12126-75]
12126 IT	Evidence for the need to update the definition of the BRDF: spectral considerations [12126-76]
12126 10	UV sensitive heterojunction ZnCoO/n-GaP prepared by spray pyrolysis [12126-77]
12126 1V	Influence of chromium sublayer on silicon P-I-N photodiodes responsivity [12126-78]
12126 1W	Dynamic interferometry method for measuring wavelength [12126-79]
12126 1X	Measurement of parameters of optically transparent films [12126-80]
12126 1Y	Optical transfer matrix: matrix correlation as frequency domain analysis of polarization imaging system (Invited Paper) [12126-82]
12126 1Z	Algorithm for diagnosing pancreatic endocrine dysfunction based on biochemical and laser polarimetric parameters [12126-83]
12126 20	The effect of photonic correction on the optical and photoelectric characteristics of the In4Se3, In4Te3 and GaP epitaxial structures [12126-84]
12126 21	Forensic medical assessment of cerebral infarction, hemorrhagic hemorrhages of traumatic genesis and determination of the duration of their formation methods of spectral-selective laser-induced direct polarization-phase tomography [12126-86]
12126 22	Polarization mapping of laser-induced monospectral fields of optically anisotropic fluorophores in forensic diagnostics of the age of the formation of damage to human organs [12126-87]
12126 23	Mueller-matrix microscopy of laser-induced monochromatic fluorescent fields of preparations of human internal organs and histological diagnostics of the time of age of damage formation [12126-89]

12126 24	Method of laser-induced polarization reconstruction of the polycrystalline structure of molecular fluorophores histological sections in histological definition age of damage internal human organs [12126-90]
12126 25	Differential diagnosis of aseptic and septic loosening of the cup of the artificial hip joint endoprosthesis by methods of spectral-selective laser autofluorescence microscopy [12126-91]
12126 26	Information medical fuzzy-expert system for the assessment of the diabetic ketoacidosis severity on the base of the blood gases indices [12126-92]
12126 27	Digital microscopic mapping of laser induced polarization ellipticity maps in differential diagnostics of preparations of benign and malignant prostate tumours [12126-95]
12126 28	Polarization interference mapping of microscopic images of protein fluorofores in the differential diagnosis of benign and malignant prostate tumours [12126-96]
12126 29	Detection of pathological changes in the architectonics of polycrystalline blood films using laser-induced polarization interferometry [12126-97]
12126 2A	Laser-induced 3D Mueller-matrix microscopy method for forensic evaluation cerebral infarction, hemorrhagic hemorrhages of traumatic genesis [12126-98]
12126 2B	Biochemical and laser-polarimetric markers of hepatocyte cytolysis syndrome under conditions of toxic damage and protein deficiency [12126-100]
12126 2C	<b>3D</b> Jones matrix layer-by-layer scanning linear and circular birefringence maps of polycrystalline polyethylene films [12126-102]
12126 2D	Polarization phase reconstruction phase anisotropy in diagnostics of the polycrystalline structure of acrylic glass [12126-103]
12126 2E	Polarization-interference mapping of polystyrene layers in the flaw detection of its polycrystalline structure [12126-104]
12126 2F	Mueller-matrix microscopy of diffuse layers of polyvinyl acetate with digital holographic reconstruction of layer-by-layer depolarization maps [12126-105]
12126 2G	Polarization: singular flaw detection of the microstructure of optically transparent polycarbonate layers [12126-106]
12126 2H	Computer vision methods for visually impaired people [12126-110]
12126 21	Peculiarities of formation of X-ray moiré images on deformation fields created by set of concentrated forces [12126-111]
12126 2J	Qualitative analysis of pulsograms by fractility indices [12126-112]
12126 2K	Software complex for optoelectronic-electronic components and sensors research [12126-113]

- 12126 2L Instrumentation for differentiation of exhaled air [12126-114]
  12126 2M Methods of analysis of encephalograph signals using neural networks [12126-115]
  12126 2N Diagnostics of haemostasis efficiency with laser illumination scattering pattern analysis [12126-117]
- 12126 20 Three-dimensional optical transfer function of optical system: from sophisticated calculation to simple approximation [12126-118]
- 12126 2P Polarization-based skin cancer detection in vivo (Invited Paper) [12126-119]