

# OPTICA APPLICATA

---

The quarterly  
of the Faculty of Fundamental Problems of Technology  
Wrocław University of Technology, Poland  
PL ISSN 0078-5466 Index 367729

---

**HONORARY EDITOR IN CHIEF** – MIRON GAJ  
**EDITOR IN CHIEF** – WAŁAW URBAŃCZYK  
**VICE-EDITOR** – AGNIESZKA POPIOŁEK-MASAJADA

## TOPICAL EDITORS

KRZYSZTOF ABRAMSKI, <i>Wrocław University of Technology, Poland</i>	Fiber optics and optical communication, spectroscopy, lasers and their applications
TADEUSZ PUSTELNY, <i>Silesian University of Technology, Gliwice, Poland</i>	Integrated optics, acoustooptics, microoptics, optical instrumentation, optical measurements, optical sensing
TOMASZ SZOPLIK, <i>Warsaw University, Poland</i>	Nanooptics, plasmonics, optical imaging, optical computing, optical data storage and processing
HENRYK KASPRZAK, <i>Wrocław University of Technology, Poland</i>	Holography, diffraction and gratings, biooptics, medical optics, optometry, optical imaging, Fourier optics
EWA WEINERT-RĄCZKA, <i>Szczecin University of Technology, Poland</i>	Nonlinear optics, optical waveguides, photonic crystals

## INTERNATIONAL ADVISORY BOARD

OLEG V. ANGELSKY, *Chernivtsy University, Ukraine*  
YASUHIKO ARAKAWA, *The University of Tokyo, Japan*  
IVAN GLESK, *University of Strathclyde, UK*  
CHRISTOPHE GORECKI, *FEMTO-ST, Besançon, France*  
EUGENIUSZ JAGOSZEWSKI (**Chairman**), *Wrocław University of Technology, Poland*  
ROMUALD JÓZWICKI, *Warsaw University of Technology, Poland*  
FRANCISZEK KACZMAREK, *Adam Mickiewicz University, Poznań, Poland*  
BOLESŁAW KĘDZIA, *Poznań University of Medical Sciences, Poland*  
MALGORZATA KUJAWIŃSKA, *Warsaw University of Technology, Poland*  
NORBERT LINDLEIN, *University of Erlangen–Nürnberg, Germany*  
MIROSLAV MILER, *Institute of Photonics and Electronics of the ASCR, v.v.i., Prague, Czech Republic*  
JAN MISIEWICZ, *Wrocław University of Technology, Poland*  
WŁODZIMIERZ NAKWASKI, *Technical University of Łódź, Poland*  
WOLFGANG OSTEN, *Universität Stuttgart, Germany*  
JAN PEŘINA, *Palacký University, Olomouc, Czech Republic*  
BARBARA PIERŚCIONEK, *University of Ulster, UK*  
COLIN SHEPPARD, *National University of Singapore*  
CONCITA SIBILIA, *Università di Roma “La Sapienza”, Italy*  
TADEUSZ STACEWICZ, *University of Warsaw, Poland*  
TOMASZ WOLIŃSKI, *Warsaw University of Technology, Poland*  
JAN WÓJCIK, *Maria Curie-Skłodowska University in Lublin, Poland*  
PAVEL ZEMANEK, *Institute of Scientific Instruments of the ASCR, v.v.i., Brno, Czech Republic*



## Contents

### Fiber optics

- Measurement of pressure sensitivity of modal birefringence of birefringent optical fibers using a Sagnac interferometer*  
C. KACZMAREK, W. WÓJCIK ..... 5
- Soft glass spiral photonic crystal fiber for large nonlinearity and high birefringence*  
S. REVATHI, S. INABATHINI, R. SANDEEP ..... 15

### Nonlinear optics

- Polarity-reversed ultra-wideband monocycle pulse generation with dual-channel multicasting in a photonic crystal fiber*  
JIAMIN GONG, ZHANQIANG HUI ..... 25

### Vision optics

- Distribution of parameters of elliptic approximation of the human pupil*  
M.A. SZMIGIEL, H. KASPRZAK ..... 41

### Grating projection profilometry

- A method for improving the precision of on-line phase measurement profilometry*  
ZHUANG MAO, YIPING CAO, LIJUN ZHONG, SENPENG CAO ..... 51

### Laser crystals

- Optical properties of Nd:YbVO<sub>4</sub> crystal*  
FENG QIN LIU, SHANG QIN SUN, CHENG YONG GAO, JIAN QIANG XU ..... 63

### Metal-dielectric gratings

- Polarization-independent metal-dielectric grating with improved bandwidth*  
BO WANG, HONGTAO LI, WENHAO SHU, WENHUA LI, LI CHEN, LIANG LEI, JINYUN ZHOU .... 71

### Microstructures fabrication

- Multi-direction digital moving mask method for fabricating continuous microstructures*  
ZHIMIN ZHANG, YIQING GAO, NINGNING LUO, KEJUN ZHONG, ZHIHUI LIU ..... 79

### Organic solar cells

- Enhancing light harvesting of organic solar cells by using hybrid microlenses*  
XIAO XIAO, ZHIYOU ZHANG, SHIWEI XIE, YU LIU, DEJIAO HU, JINGLEI DU ..... 89

**Polarization coding**

<i>SO(3) matrix transformation for rapid polarization search and coding in a three-plate polarizer</i> CHUNHUI HUANG, XUEJIN WANG .....	101
--	-----

**Size measurements**

<i>Precise sub-pixel size measurement with linear interpolation</i> AIJUN YIN, ZHENGYI YANG, GUANGQIAN LONG .....	113
--	-----

**Sol-gel coatings**

<i>Chemical resistance of SiO<sub>2</sub> layers obtained by the sol-gel technique on a glass substrate</i> M. NOCUŃ, M. ŚRODA, M. CIECIŃSKA .....	125
---	-----