PROCEEDINGS OF SPIE

Advances in 3OM: Opto-Mechatronics, Opto-Mechanics, and Optical Metrology (3OM 2023)

Virgil-Florin Duma
Jannick P. Rolland
Adrian G. H. Podoleanu
Mircea Guina
Cosmin Sinescu
Editors

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Introduction

This **2nd Edition of the 'Advances in 3OM' SPIE-affiliated Conference** (https://3om-group-optomechatronics.ro/advances-in-3om-conference-2023/) was held (like the 1st Edition) in the beautiful city of *Timisoara – 2023 European Capital of Culture* (https://timisoara2023.eu/en/), in the Western part of Romania, honoring 2023 International Day of Light (IDL) and celebrating 100 years of the Polytechnic University of Timisoara.

The main organizer of this series of Conferences has been the **3OM Optomechatronics Group**, which is at the core of an in-development **Photonics Pole** in Western Romania, uniting especially the *Polytechnic University of Timisoara* (through the Faculty of Electronics, Telecommunications, and Information Technology), the "*Aurel Vlaicu" University of Arad* (through the Research Center in Mechanical Engineering and Mechatronics, Faculty of Engineering), and the "*Victor Babes" University of Medicine and Pharmacy of Timisoara* (through the Faculty of Dental Medicine) as academic institutions. Also, in the regional R&D ecosystem, the 3OM Group has been actively involved in technology transfer projects with SMEs such as Inteliform Timisoara and is currently developing collaboration links with major players such as CONTINENTAL Automotive Timisoara and AUTOLIV Lugoj.

We wish to extend our sincere gratitude to all **the institutions that co-organized** the Conference: the Polytechnic University of Timisoara, SPIE – The International Society for Optics and Photonics, AdrVest-Agency for Regional Development for West Region (Romania), and the 'Victor Babes' University of Medicine and Pharmacy of Timisoara. Also, very special thanks to our **sponsors**: OPTICA (formerly OSA – Optical Society of America), AVANTIER (USA), CONTINENTAL Automotive Romania, COST Action CA21159 PhoBioS, Picophotonics Finland, Photonics (Switzerland), and Materials (Switzerland).

The 3OM concept, introduced in 2008 unites three complementary domains:

Opto-Mechatronics is a blend of Optics & Photonics, Precision Mechanics, Electronics, Control & Automation, as well as IT. The concept of optomechatronics was introduced in 2005 by Prof. Hyungsuck Cho from KAIST, South Korea in his seminal book with the same name (https://doi.org/10.1201/9781420039528).

Opto-Mechanics usually fills the gap between the high requirements of Optical Design and the practical capabilities of Mechanical Technologies, addressing tolerances, errors, positioning issues, as well as methods to tackle them. Kinematic and dynamic aspects of optical systems with moving parts are also approached, and this leads back to Control & Automation (as included in Mechatronics), but also to material issues, involving for example Finite Element Analyses (FEA).

Optical Metrology comprises a large umbrella of applications which benefits from both domains above and includes fields as diverse as industrial measurements (e.g., for Non-Destructive Testing (NDT)), biomedical imaging (with a wide range of techniques, for example Optical Coherence Tomography (OCT) or Photoacoustic), Remote Sensing, as well as Security & Defense.

Other fields that apply 3OM have also been within the topics of the Conference, including Laser Manufacturing and Robotics, as well as Lasers in Medicine.

*This **2nd Edition of 'Advances in 3OM'** included a total of 105 presentations*:

8 Plenary Presentations: Iulian Vasile Antoniac (Polytechnic University of Bucharest, Romania); Mircea Guina (Tampere University, Finland); Kirill V. Larin (University of Houston, USA); Irina V. Larina (Baylor College of Medicine, Houston, USA); Adrian Podoleanu (University of Kent, UK); Marija

Strojnik (Scholl) (Optics Research Center in Leon, Mexico); Yuzuru Takashima (Wyant College of Optical Sciences, Tucson, USA); Calin Alexandru Ur (ELI-NP, Bucharest, Romania).

11 Keynote Presentations: Ioan Dancus (ELI-NP/Horia Hulubei National Institute for Physics and Nuclear Engineering, Bucharest, Romania); Alessandra Giuliani (Polytechnic University of Marche, Italy); Roger M. Groves (Delft University of Technology, The Netherlands); Teemu Hakkarainen (Tampere University, Finland); Tapio Niemi (Tampere University, Finland); Nicolaie Pavel (National Institute for Laser, Plasma and Radiation Physics, Romania); Jyrki Saarinen (University of Eastern Finland); Cosmin Sinescu ("Victor Babes" University of Medicine and Pharmacy of Timisoara, Romania); Malgorzata Szczerska (Gdansk University of Technology, Poland); Carmen Darinca Todea ("Victor Babes" University of Medicine and Pharmacy of Timisoara, Romania).

18 Invited Presentations: Oleg V. Angelsky (Chernivtsi National University, Ukraine); Charles Bibas (CEO & Founder of Tecnica, Inc., USA); Radu Ciprian Bilcu (Huawei Research Center, Finland); Lucian Toma Ciocan ("Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania); Constantin Daniel Comeaga (Polytechnic University of Bucharest, Romania); Antoine Courjaud (Amplitude, France); Biljana Gaković (University of Belgrade, Serbia); Tomohiko Hayakawa (Tokyo University of Science, Japan); Mihai Iovea (ACCENT PRO 2000 s.r.l. (AP2K), Bucharest, Romania); Anca Jivanescu ("Victor Babes" University of Medicine and Pharmacy of Timisoara, Romania); Franck Leibreich (THALES, France); Horia Manolea (University of Medicine and Pharmacy, Craiova, Romania); Cristina Polonschii (International Centre of Biodynamics, Bucharest, Romania); Nicolina Pop (Polytechnic University of Timisoara, Romania); Cristian Ratiu (University of Oradea, Romania); Vladimir A. Sreckovic (Institute of Physics Belgrade, Serbia); Dan Stutman (ELI-NP, Bucharest, Romania); Daniel Ursescu (ELI-NP, Bucharest, Romania)
Also, the conference included ***32 Oral and 30 Poster presentations***.

In comparison, at the first, 2021 edition, the conference had a total number of 58 participants, from which 7 plenary, 9 keynote, 10 invited, 18 oral (regular), and 14 with poster presentations.

A part of these accepted and presented contributions were submitted for publication in Proceedings of SPIE and are made available on SPIE Digital Library, while the Proceedings of the 1st Edition of the Conference have already been published on-line at: https://www.spiedigitallibrary.org/conference-proceedings-of-spie/12170.toc.

The printed **Book of Abstracts** was made available for the participants during the Conference. It is published by the "Politehnica" Publishing House, Timisoara, in a series with ISSN 2810-5249. Also, an on-line version can be accessed on Research Gate at https://www.researchgate.net/publication/376645695_2nd_Intl_Conference_Advances_in_3OM_Opto-Mechatronics_Opto-Mechanics_and_Optical_Metrology_Book_of_Abstracts.

The Book of Abstracts of the 1st Edition is also posted in an on-line format at:
https://www.researchgate.net/publication/358349689_Book_of_Abstracts_1st_Int_Conference_ADVANCES_in_3OM_OPTO-MECHATRONICS_OPTO-MECHANICS_and_OPTICAL_METROLOGY_13-16_December_2021_Timisoara_ROMANIA

Special Issues: Papers recommended by the Scientific Committee have been submitted for publication in (and they undergo the regular peer-review process of) Special Issues of several high-impact journals (please see the right-side menu of the Conference site).

Within the tracks of this 2nd Edition of the Conference, **three workshops** were organized:

1) Workshop of The Extreme Light Infrastructure ELI-NP (Bucharest, Romania) – 11 December 2023.

2) Workshop organized by the regional support ecosystem partners: West Regional Development Agency and Tehimpuls Association with the support of ADMA TranS4MErs Horizon Project – 12 December 2023.

3) Workshop of COST Action 21159 PhoBioS – 13 and 14 December 2023.

Students of the Polytechnic University of Timisoara and of the 'Victor Babes' University of Medicine and Pharmacy of Timisoara have had free access to the Conference - in line with **the main scope of the Conference: to raise awareness on Optics and Photonics in Timisoara and Romania in general, also providing a networking tool in these fields for the entire geographic area, i.e., for Central and Eastern Europe**.

Prof. Virgil-Florin Duma
General Chair