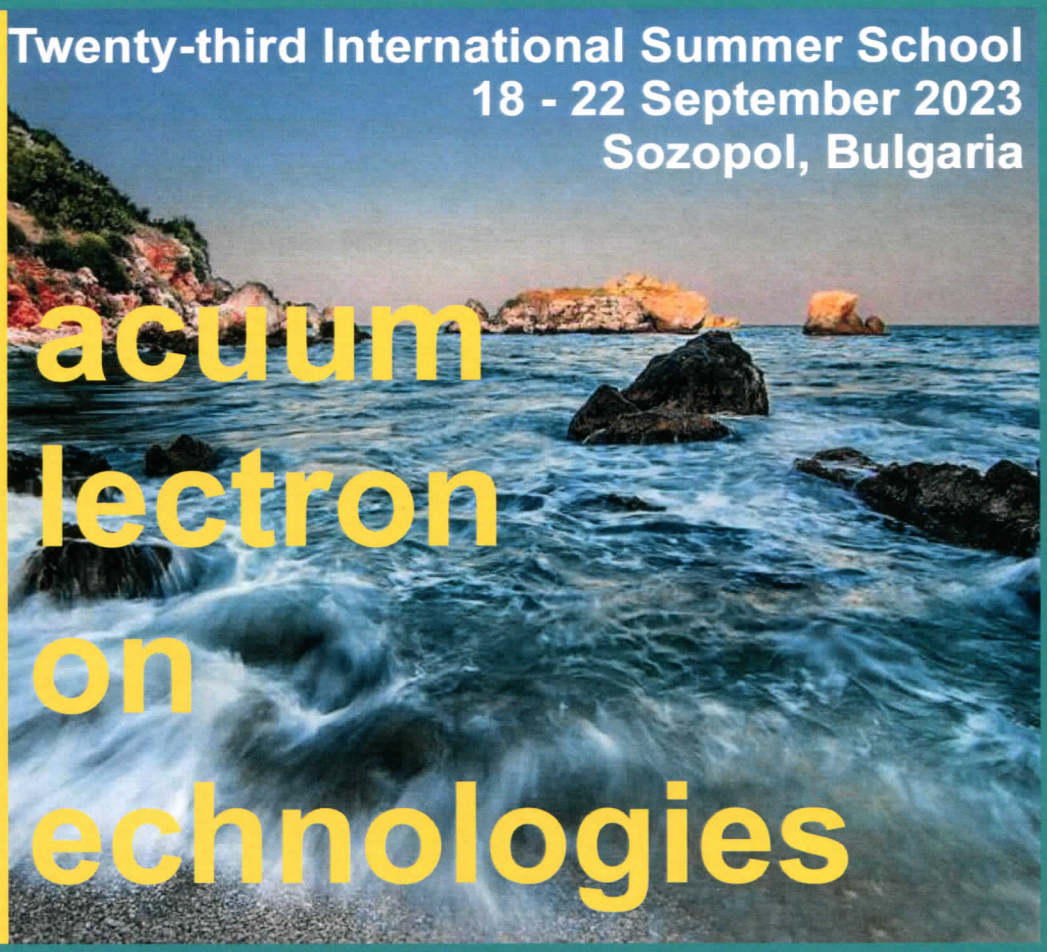
Twenty-third International Summer School
18 - 22 September 2023
Sozopol, Bulgaria



VEIT
Vacuum Electron Ion Technologies

PROGRAM
ABSTRACTS

TWENTY-THIRD INTERNATIONAL SUMMER SCHOOL ON VACUUM, ELECTRON AND ION TECHNOLOGIES

VEIT 2023

18 - 22 September 2023
SOZOPOL, BULGARIA

Jointly organized by the Institute of Electronics of the Bulgarian Academy of Sciences and the Dutch Institute for Fundamental Energy Research, The Netherlands

Dedicated to the 60th Anniversary of the Bulgarian organizer of the event

TWENTY-THIRD INTERNATIONAL SUMMER SCHOOL ON VACUUM, ELECTRON AND ION TECHNOLOGIES

VEIT 2023

18 - 22 September 2023
SOZOPOL, BULGARIA

PROGRAM
ABSTRACTS

Editors: M. Dimitrova, Ch. Ghelev, B. Georgieva and E. Vasileva

VEIT '23

TWENTY-THIRD INTERNATIONAL SUMMER SCHOOL
ON VACUUM, ELECTRON AND ION TECHNOLOGIES
18 – 22 September 2023, Sozopol, Bulgaria

ORGANIZED BY

INSTITUTE OF ELECTRONICS
BULGARIAN ACADEMY OF SCIENCES, SOFIA, BULGARIA

DUTCH INSTITUTE FOR FUNDAMENTAL ENERGY RESEARCH
EINDHOVEN, THE NETHERLANDS

CO-FINANCED by the: MINISTRY OF EDUCATION AND SCIENCE OF REPUBLIC OF BULGARIA, BULGARIAN NATIONAL SCIENCE FUND,
Project № KP-06-MNF/5/19.05.2023

25 YEARS OF EPJ.org
your physics journal
Young Researcher Attendance Grant

Bulgarian Academy of Sciences

Union of the Physicists in Bulgaria

CHAIRS OF THE SCHOOL

M. Dimitrova, Institute of Electronics, Bulgarian Academy of Sciences, Sofia, Bulgaria
M.C.M. van de Sanden, Dutch Institute for Fundamental Energy Research, Eindhoven, The Netherlands

INTERNATIONAL ADVISORY COMMITTEE

N. Nedyalkov	Bulgarian Academy of Sciences, Sofia, Bulgaria
M. Dimitrova	Czech Academy of Sciences, Prague, Czech Republic
R. Panek	Czech Academy of Sciences, Prague, Czech Republic
Th. Czerwiec	Institut Jean Lamour (IJL), Ecole des Mines de Nancy, Nancy, France
H. Kersten	IEAP University of Kiel, Kiel, Germany
D. Mataras	University of Patras, Patras, Greece
V. Guerra	Instituto Superior Técnico, Lisboa, Portugal
G. Dinescu	National Institute for Laser, Plasma and Radiation Physics, Magurele Bucharest, Romania
Z. Petrovic	Institute of Physics, Belgrade, Serbia
M. Mozetic	"Jozef Stefan" Institute, Ljubljana, Slovenia
I. Katardjiev	Uppsala University, Uppsala, Sweden
M.C.M. (Richard) van de Sanden	Dutch Institute for Fundamental Energy Research (DIFFER), Eindhoven, The Netherlands
G. J. van Rooij	Dutch Institute for Fundamental Energy Research (DIFFER), Eindhoven, The Netherlands
M. Ürgen	Istanbul Technical University, Istanbul, Turkey
A. Ehiasarian	Sheffield Hallam University, Sheffield, UK
I. Petrov	University of Illinois, Urbana, IL, USA

LOCAL ORGANIZING COMMITTEE

Ch. Angelov, I. Balchev, M. Dimitrova (Chair), B. Georgieva, Ch. Ghelev, P. Ivanova, E. Taskova, E. Vasileva

MAIN SCIENTIFIC TOPICS:

- THIN FILMS DEPOSITION
- SURFACES AND THIN FILMS PROCESSING AND ANALYSIS
- COATINGS FOR ADVANCED APPLICATIONS
- NEW MATERIALS
- PLASMA-SURFACE INTERACTION AND PLASMA DIAGNOSTICS
- GREEN TECHNOLOGIES
- MODELING AND COMPUTER SIMULATION

PLENARY AND POSTER SESSIONS:

A: THIN-FILMS DEPOSITION
COATINGS FOR ADVANCED APPLICATIONS

B: NEW MATERIALS. PLASMA-SURFACE INTERACTION AND PLASMA DIAGNOSTICS. GREEN TECHNOLOGIES. MODELING AND COMPUTER SIMULATION

C: SURFACES AND THIN FILMS PROCESSING AND ANALYSIS

ABBREVIATIONS:

TL – TOPIC LECTURE
PR – PROGRESS REPORT
OP – ORAL PRESENTATION
PA – POSTER SESSION A
PB – POSTER SESSION B
PC – POSTER SESSION C

POST DEADLINE CONTRIBUTION

PB-27

LOW-TEMPERATURE MICROWAVE PLASMA AT ATMOSPHERIC PRESSURE WITH AEROSOLS: TREATMENT OF LIQUID SAMPLES

N. Babucić, N. Škoro and N. Puač

Institute of Physics, University of Belgrade, Belgrade, Serbia

The investigation of low-temperature plasma (LTP) has revealed a wide range of applications, particularly in water decontamination, wound treatment using plasma-activated liquid (PAL), and agricultural practices. PAL contains reactive species and, consequently, has antimicrobial and antibacterial effect influencing the cells at different levels. However, one of the main challenges in plasma-water interaction is enhancing the flux of reactive species from the plasma. To address this challenge, the introduction of micrometer-scale aerosol droplets immersed in plasma has proven promising. This configuration offers a high surface-to-volume ratio, significantly increasing the contact area for water and potentially leading to higher rates of chemical interaction between the plasma in the gas phase and the liquid. [1]

To optimize the properties of PAL, it becomes necessary to employ various plasma sources, one of them being microwave plasma source. In the current phase of the experiment, the plasma operates with an argon flow ranging from 1 – 7 slm, without the addition of aerosols. The inductively-coupled surface-wave launcher facilitates the transfer of energy from the microwave generator to the plasma, allowing for uniform plasma formation within the quartz tube. This configuration offers advantages, such as high efficiency, plasma stability, and reduced risk of electrode contamination, making it a possible preferred choice for generating LTP in research and industrial applications.

Our analysis involved studying recordings of emissions originating from various regions of the plasma, using images to capture the spatial structure and optical emission spectra. To determine the presence of reactive nitrogen and oxygen species in plasma-activated liquid (PAL), colorimetric techniques were employed.

By assembling an experiment utilizing a microwave (MW) plasma source for aerosol treatment, we aim to characterize the plasma, study the interaction between plasma and droplets, and analyze the treated water to gain a better understanding of the high chemical reactivity gas-liquid reactions.

Acknowledgment:
This work was supported by the Sci. Fund of the RS, no. 7739780 - APPerTAin-BIOM and MSTDI Republic of Serbia grant number 451-03-68/2022-14/200024. This article is basedupon work from COST Action PlAgri, CA19110, supported by COST (European Cooperation in Science and Technology).

References:

1. Stancampiano A., Gallingani T., Gherardi M., et al., Applied Sciences, 9(18) (2019), 3861, 10.3390/app9183861c