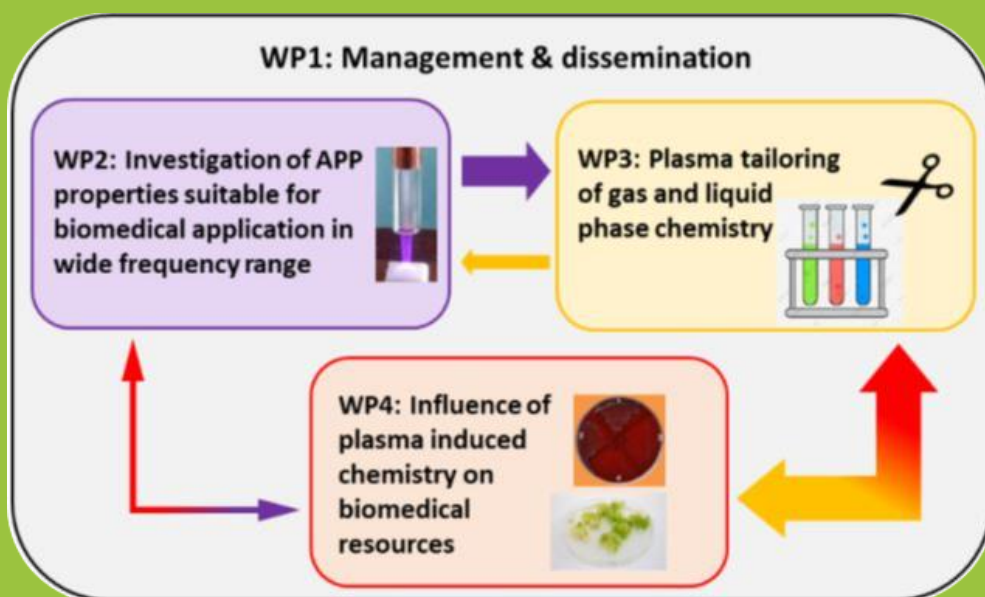


The main idea of APPerTAIN-BIOM project is to tailor rich plasma chemistry to be effective green technology for treatment of drug-resistant bacteria or plant cells for production of chemical compounds needed in pharmacy or cosmetics. With this in mind we have started to assemble laboratory pilot Atmospheric Pressure Plasma (APP) systems that will be characterized and optimized for application during the APPerTAIN-BIOM project.

In order to be able to set the guidelines for technology transfer at the end of the project we need to know in great detail plasma chemistry in gas phase and its interaction with liquids. This first period was used for further literature search and procurements of necessary equipment and consumables. Also, the first aseptic in vitro carrot calli culture is set up and it will serve as source of plant material during the project.

Work packages of APPerTAIN-BIOM



Project Partners - Science and Research Organizations (SRO)



Institute of Physics Belgrade, University of Belgrade (IPB)



School of Dental Medicine, University of Belgrade (STOMF)



Faculty of Medicine (School of Medicine), University of Belgrade (MFUB)

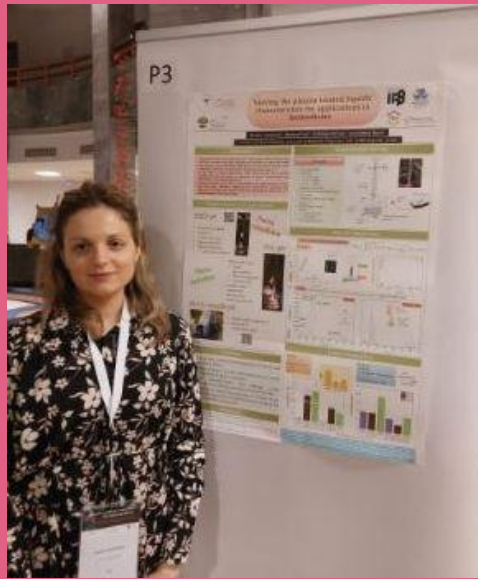


Institute for Biological Research Siniša Stanković, University of Belgrade (IBISS)

News:

- **February 2023** – N. Babucić and O. Jovanović have presented project work in Bari, Italy
- **February 2023** - Visit by Ambassador of Republic of Korea
- **March 2023** - Working breakfast at the Science Fund
- **March 2023** - Project members visiting colleagues from Wigner Institute, Hungary
- **April 2023** - Dr N. Puač has presented at the the PlasmaTech 2023 conference
- **April 2023** - Project quarterly meeting!
- **May 2023** - Attending 8th ICAPT in Slovenia
- **May 2023** – O. Jovanović visited prof. F. Krčma at Masaryk University
- **July 2023** - Visit by Dr T. Field from Belfast University
- **July 2023** – S. Živković has attended PBE 2023
- **July 2023** – Visit by molecular biologist Dr A. Morina
- **July 2023** – N. Škoro and O. Jovanović have attended 35th ICPIG

Neda Babucić and Olivera Jovanović have presented APPerTAin-BIOM accomplishments at the 2nd Training School “Cold plasmas to fight microorganisms, viruses & toxins for medical and agricultural applications” in Bari, Italy.



Visit by Ambassador of Republic of Korea!
This meeting was very important for the members of APPerTAin-BIOM project because of the strong plasma community that works in R. Korea in the fields of Plasma Medicine and Plasma Agriculture.

Science Fund has organized a working breakfast for the PIs of the Idea Projects. It was a great opportunity to meet other colleagues and hear about their projects. .





Dr Nevena Puač, Dr Nikola Škoro and Neda Babucić visited colleagues from Wigner Institute, Budapest Hungary in order to discuss the characterization of MW plasma source.

Dr Nevena Puač has presented specific aspects of the APPerTAin-BIOM project the PlasmaTech 2023 conference.



APPerTAin-BIOM Q5 meeting at the Institute of Physics Belgrade. Discussion about the new experiments, internal database for experimental setups and the first draft of paper for journal.

Creation of reactive species by two atmospheric pressure plasma sources while treating water for biomedical applications

Neda Babucić¹, Olivera Jovanović², Nikola Škoro³ and Nevena Puač⁴
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Abstract

The development of two atmospheric pressure plasma sources for producing reactive species (ROS and RNS) is presented. The first one is based on the dielectric barrier discharge (DBD) technique and the second one is based on the atmospheric pressure glow discharge (APGD) technique. The experimental setup and the results are presented. The results show that the APGD source is more efficient in producing reactive species than the DBD source. The results also show that the APGD source is more suitable for biomedical applications than the DBD source.

Introduction

Atmospheric pressure plasma sources have been used for biomedical applications in the field of cancer treatment, wound healing, and disinfection. The plasma sources produce reactive species (ROS and RNS) which are known to have cytotoxic effects on cells. The plasma sources also produce UV radiation which is known to have antibacterial effects. The plasma sources are also used for the treatment of water. The plasma sources produce reactive species which are known to have antibacterial effects on water. The plasma sources are also used for the treatment of water. The plasma sources produce reactive species which are known to have antibacterial effects on water.

Experimental set-up

The experimental setup for the production of reactive species by the atmospheric pressure plasma sources is shown in Figure 1. The setup consists of a high voltage power supply, a transformer, a dielectric barrier discharge (DBD) reactor, and a glow discharge reactor. The DBD reactor is a cylindrical reactor with a dielectric barrier. The glow discharge reactor is a cylindrical reactor with a central electrode. The plasma sources are connected to the high voltage power supply through the transformer. The plasma sources are used to produce reactive species which are then used for biomedical applications.

Experimental results

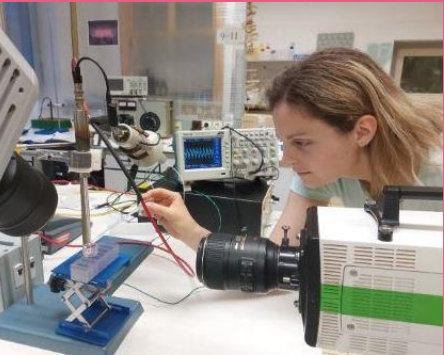
The results of the experiments are shown in Figure 2. The results show that the APGD source is more efficient in producing reactive species than the DBD source. The results also show that the APGD source is more suitable for biomedical applications than the DBD source.

Conclusions

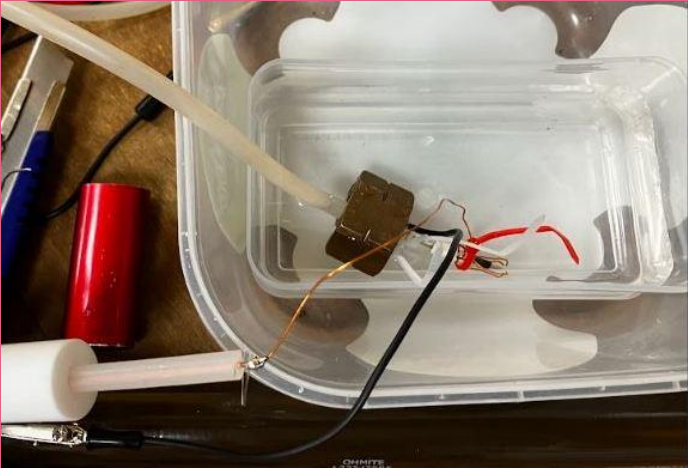
The results of the experiments show that the APGD source is more efficient in producing reactive species than the DBD source. The results also show that the APGD source is more suitable for biomedical applications than the DBD source.



Neda Babucić, Nevena Puač, Olivera Jovanović and Nikola Škoro and have attended 8th ICAPT in Gozd Martuljek, Slovenia.

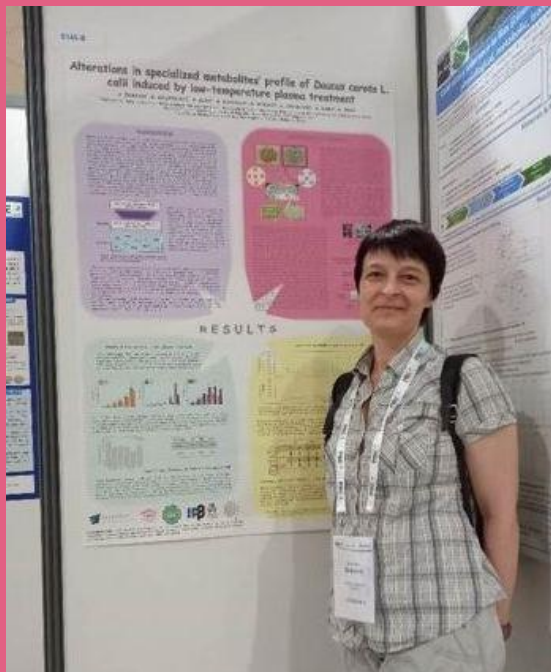


Olivera Jovanović visited prof. Franišek Krčma at Masaryk University as a ongoing collaboration. We have used their high speed camera and their expertise to characterize atmospheric pressure kHz pin-jet.



We had a visit by Prof. Dr Thomas Field from Belfast University, North Ireland, UK. This visit resulted in the creation of the new underwater discharge.





Suzana Zivkovic has attended Plant Biology Europe meeting (PBE 2023) held in Marseille (France), July 3rd-6th, 2023. Meeting was hosted by the Federation of the European Societies of Plant Biology FESPB.

With the help of molecular biologist Dr A. Morina we have successfully finished experiments with Lemna minor and tested toxicity of PAW.

Physicists now know how to measure chlorophyll in plants. And we managed to play with a new toy Implen NanoPhotometer (hopefully one day ours) thanks to Labena Serbia.



Nikola Škoro and Olivera Jovanović have attended 35th ICPIG in Egmond aan Zee, The Netherlands.

