

Report on the outcomes of a Virtual Mobility¹

Action number: CA19110

Grantee name: Ana Sainz García

Virtual Mobility Details

Title: Generation of PAW for biological decontamination and chemical degradation

Start and end date: 01/10/2023 to 20/10/2023

Description of the work carried out during the VM

Description of the virtual collaboration and activities carried out during the VM, with focus on the work carried out by the grantee. Any deviations from the initial working plan shall also be described in this section.

(max. 500 words)

The first objective of this Virtual Mobility was to illustrate and describe in a video the most important reactive species that play the main role in Plasma Activated Water not only for bacteria inactivation but also for chemical decomposition. There were also showed the pathways though the ones those reactive species are created emphasizing why some Plasma Activated Waters have activity after days or months of storage. Moreover, there were discussed different methods of measuring reactive species of PAW giving great explanation of some of them. The last slides of the video were related to the possibility of modify reactive species changing Plasma Activated Water generation parameters.

It is worth mentioning that the theoretical part of the first video was done after looking in bibliography.

In this Virtual Mobility a second video was also carried out. In this case, the first step was to send a survey to all the PIAgri members and 18 inputs were received. The survey was done in order to know the plasma systems used, the objectives and the treatment conditions applied and if the groups with two or more purposes operate with one plasma system for all of them. Finally, it was explained the advantages of having one plasma system for several objectives and it was described a practical example of how can be modified one plasma equipment for two different purposes (biological decontamination and chemical decomposition).

¹ This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

Description of the VM main achievements and planned follow-up activities

Description and assessment of whether the VM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the VM. Agreed plans for future follow-up collaborations shall also be described in this section.

(max. 500 words)

Within this Virtual Mobility a specific point of view of some theoretical issues related to reactive species and their reactions were given to PIAGri members in order to improve their researches. Specifically, examples of equipment for reactive species quantification were described.

Additionally, it is expected to create a network with the PIAGri members. In this line, the survey asked about the challenges and the necessities of the researchers. In this way, the present VM represents an opportunity to improve the connections among researchers and to help research groups in the sharing of equipment.

Finally, since it was showed how one plasma system is used for different purposes it should be possible that other plasma groups work in order to apply plasma treatment with one equipment. Then, they will benefit from the advantages given by this fact.

To sum up, the following MoU objectives were achieved:

- Analysis of the existing problems associated with seeds (germination percentage, rate, uniformity, and seed-borne infections), plants (fertilization, watering etc.) and food products (decontamination, packaging etc.) →

The survey asked to the plasma groups which are the objectives they are seeking with the application of Plasma Activated Water.

- Identification and optimization of the most promising plasma source for treatment of seeds, fruits, foods and plants in general. →

The survey asked the parameters used for each Plasma Activated Water generation. Moreover, there was a text box for each objective and the specific parameters for the PAW used and the conditions for the PAW treatment with that purpose.

- Definition of procedures and protocols for specific optimized cold plasma technologies used in treatments of seeds, creation of PAW, removal of pollutants and application in food technology with attention to legislation, energy consumption, cost-effectiveness, food safety and quality aspects. →

The survey asked the parameters used for each Plasma Activated Water generation. Moreover, there was a text box for each objective and the specific parameters for the PAW used and the conditions for the PAW treatment with that purpose. Finally, one of the two videos show how is possible to use only one plasma system for two different purposes in order to generate the best PAW for each one.

- Detailed investigation of the interaction of plasma created species (in gaseous and liquid phase) with seed/plant cells – identification of the main mechanisms involved in plasma-cell interactions →

A bibliographical work was done in order to know what happens during PAW generation and after the plasma system turns off. Furthermore, all that information was reflected in a video where several

reactions to create reactive species in PAW are explained. Besides, the video shows how the generation time and the gas flow applied when generating PAW influences in the final characteristics of the PAW.

As said above, a network among researchers is planned in order to connect people and solve problems related to the necessities of specific equipment and specific analysis.