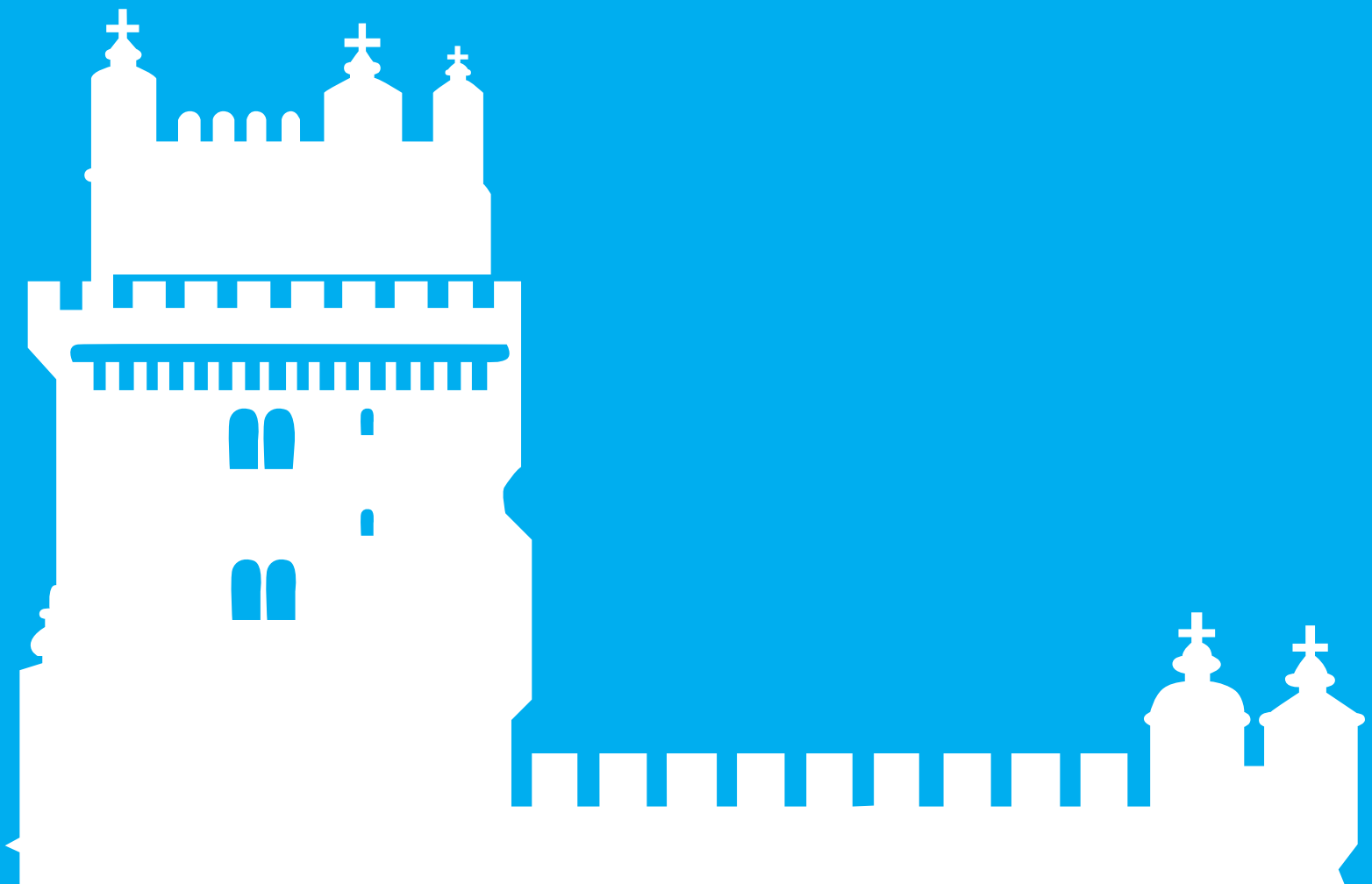
ICPIG 2017

XXXIII INTERNATIONAL CONFERENCE ON PHENOMENA IN IONIZED GASES

CONFERENCE PROCEEDINGS



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The XXXIII ICPIG was organized in accordance with IUPAP principles, regarding the free circulation of scientists for international collaborations and discussions, as stated in the declaration of the International Council of Science, adopted at the 26th General Assembly in 2008 and endorsed by the 27th General Assembly in 2011. In particular, no *bona fide* scientist is excluded from participation on grounds of origin, nationality or political considerations unrelated to science.

Activity of catalase enzyme in *P. tomentosa* seeds after direct plasma treatments and treatments with plasma activated water

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In this abstract we report on influence of direct and indirect plasma treatments on catalase enzyme activity in *Paulownia tomentosa* seeds. The direct treatment of the seeds was performed in low-pressure RF plasma system for different treatment times. After treatments these seeds were imbibed with distilled water. The other set of *P. tomentosa* seeds was imbibed with plasma activated water (PAW). PAW was produced by using atmospheric pressure plasma source in treatments with different durations. Seeds from both sets were exposed to the same conditions and after 5 days activity of catalase enzyme was measured. In comparison to the control sample, differences in the activity was observed both regarding direct and PAW treated seeds and regarding duration of treatments.

1. Introduction

Non-equilibrium low and atmospheric pressure plasmas can be efficiently used in stimulation of seed growth, increase of germination percentage and decontamination, breaking of dormancy or increase in the length of seed sprout. We have developed several low pressure and atmospheric pressure plasma systems for treatment of seeds and plant cells [1-3]. Here we will present the results obtained in treatments of *Paulownia tomentosa* seeds by non-equilibrium plasma that operates at low and atmospheric pressures. We have determined the germination percentage and activity of catalase enzyme for all treated samples and compared it to the control samples.

2. Results and discussion

Low pressure plasma treatments of seeds were performed in the cylindrically shaped RF plasma system that operates at 13.56 MHz reactor. The seeds were then imbibed with distilled water. Unlike low pressure plasma treatments where seeds were in direct contact with plasma, in case of atmospheric pressure plasma treatments we have treated distilled water (PAW) which was then used for imbibition of seeds. After the imbibition process seeds were exposed to red light for 5 min. In Figure 1 we show activity of catalyse enzyme 5 days after imbibition of water. The catalase activity for the treated samples is increased comparing to the untreated sample. This is in accordance with the observed increase in germination percentages obtained for this samples.

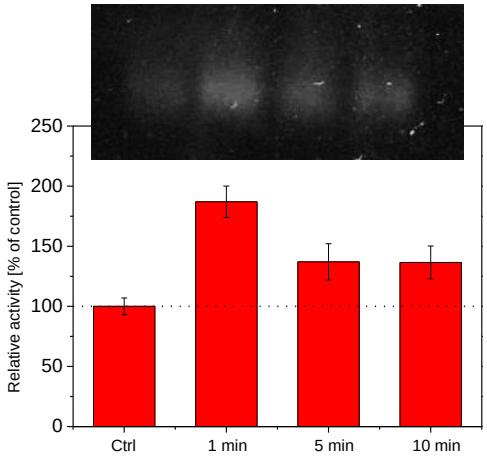

Figure 1. The activity of the catalase enzyme obtained by using native page. Data was obtained five days after the imbibition of water (distilled).

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3. References

[1] N. Puač, Z.Lj. Petrović, S. Živković, Z. Giba, D. Grubišić and A.R. Đorđević, *Plasma Processes and Polymers*, Wiley-VCH Verlag GmbH & Co. (2005).

[2] N. Puač, Z.Lj. Petrović, G. Malović, A. Đorđević, S. Živković, Z. Giba and D. Grubišić, *J. Phys. D:Appl. Phys.* **39** (2006) 3514-3519.

[3] N. Puač, S. Živković, N. Selaković, M. Milutinović, J. Boljević, G. Malović and Z.Lj. Petrović, *Appl. Phys. Lett.* **104**(21) (2014) 214106.