

Atmospheric pressure plasma treatment of agricultural seeds with effect on wettability and surface chemical changes

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Diffuse coplanar surface barrier discharge (DCSBD) at atmospheric pressure in ambient air was used for plasma treatment of agricultural seeds. The aim of plasma treatment was improvement of wettability and potential reduction of pathogens. Lettuce seeds were plasma treated for a few seconds and analyzed with SEM, XPS and method for measurement of water uptake. Surface morphology was not affected with plasma treatment. Plasma treatment caused surface chemical changes and improvement of water uptake with only slight decrease of germination in comparison with untreated seeds. Change in percentage of chemical bonds containing carbon and oxygen was observed. Significant increase of O/C ratio after few seconds of plasma treatment was reached.

Improvement of germination, reduction of diseases, changing of water absorption properties are crucial parameters for growth process of agricultural seeds. Different plasma sources are used for plasma treatment of seeds.

Plasma treatment of agricultural seeds e.g. lettuce using Diffuse coplanar surface barrier discharge (DCSBD) operating in ambient air at atmospheric pressure is presented in this contribution.

Diagnostics methods used for evaluation of plasma treated seeds were: scanning electron microscopy (SEM), X-ray photoelectron spectroscopy (XPS) and method for measurement of water uptake (Washburn method).

Germination of plasma treated seeds is depending on the duration of plasma treatment. No structural damages were observed on lettuce seeds plasma treated for 10 s (Figure 1). Improvement of water uptake after the plasma treatment was obvious which is important for planting of seeds. Increase in content of oxygen and decrease in content of carbon was observed after the plasma treatment. O/C ratio significantly increased after plasma treatment which indicates hydrophilization of seeds. Potential effect of plasma treatment on pathogens and microorganisms incidence on seeds will be studied.

The conclusion is that DCSBD plasma treatment in order of few seconds is able to affect the properties of agricultural seeds.

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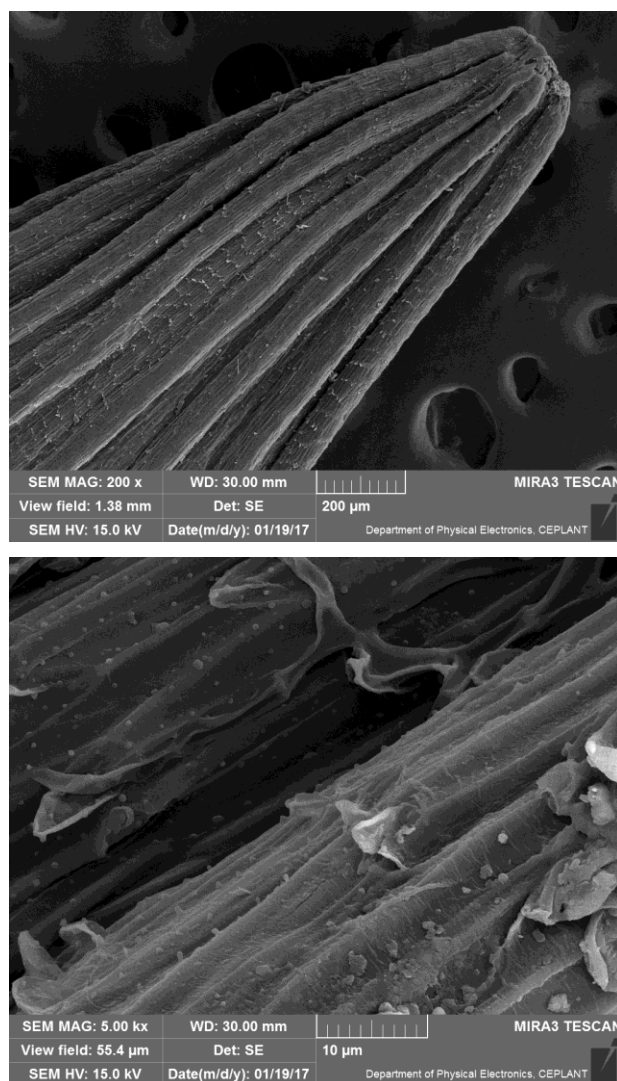


Figure 1. Surface morphology of plasma treated lettuce seeds.