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Low pressure, variable RF-frequency CCP for treatment of hydrocolloidsChristoph Ellert¹, Michael Beyrer², Renaud Favre³, Davor Volic⁴

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The antimicrobial effectiveness of non-thermal plasma is scientifically accepted. Hydrocolloids are largely used as additives in food and pharmaceutical products. Sterilization of native hydrocolloids remains difficult by conventional thermal treatment and justifies research on emerging technologies. However, the effects of plasma treatments on functional properties of hydrocolloids and relation to plasma properties are not yet sufficiently investigated.

We present a newly build capacitively coupled plasma apparatus for the treatment of various food and pharmaceutical materials. The parameter range covers low pressures (0.5 mbar to 20 mbar), using variable temperature (20°C to 300°C) and various common gases, at power densities between 0.1 W/cm² and 1.5 W/cm². A particular feature is the possibility to vary the frequency between 13 MHz and 100 MHz, since this allows even at higher plasma densities to reduce the ion bombardment thus eliminating the damage induced by ions impinging on the material. The plasma is characterized online by optical emission spectroscopy from 200 nm to 1100nm. First results of the plasma properties and its influence on starch will be shown.

Functional properties of hydrocolloids were characterized by dynamic scanning calorimetry, rheology and dynamic vapour sorption analysis.

Keywords

plasma
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bacteria
inactivation