شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

HANAA ALY

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

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Decontamination of broiler chicken breast fillets using innovative cold plasma technology

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Abstract

(**Keywords:** cold plasma; broiler chicken meat, decontamination, bacteriological quality, deterioration criteria, sensory attributes, topographical structure)

The increase of consumers' awareness about the term safety and the importance of the production of microbiologically safe chicken meat encouraged the researchers and food processors to discover a novel decontamination method that is chemically free. Atmospheric cold plasma (ACP) is an emerging non-thermal technology, showing great potential applications in the food industry. Therefore, the aim of this study to investigate the effect of ACP mainly dielectric barrier discharge with different gases (oxygen and argon) and different times (3 min and 5 min) at 20 kV on the bacteriological quality, deterioration criteria, physicochemical parameters, sensory attributes, and topographical structure of chicken breast fillets using the scanning electron microscope. Samples were divided into five groups as follow: the first and second groups were treated with oxygen at 3 min (Oxy3) and 5 min (Oxy5), while the third and fourth groups were treated with argon at 3 min (Ar3) and 5 min (Ar5) beside the control untreated samples. The results showed that all plasma-treated samples induced a significant reduction in all investigated bacterial counts, shear force, and pH values with non-significant changes in TBA, TVBN, and cooking loss%. Moreover, significant improvement of all sensory attributes in all plasma-treated samples except appearance and color scores of Oxy3 and Oxy5 samples were observed. The topographical structure of argon-treated samples showed severe fragmentation in muscle fiber with a wavy appearance and coagulated connective tissue while oxygen-treated samples revealed shallow cracks, coagulated muscle fibers, and amorphous mass connective tissue. The consumed power at the applied voltage (16kV) with oxygen and argon was 0.25 and 0.064 Watt, respectively. Accordingly, DBD plasma treatment with argon gas is a prospective decontamination method that could be applied safely at the poultry processing plants without any negative impact on the appearance and quality of poultry meat.

Dedication

To the memory of my father

To my mother

To my wife

To all my family

First of all, prayerful thanks to ***ALLAH,*** *for everything I have.*

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LIST OF ABBREVIATIONS

ACP	Atmospheric cold plasma
APC	Aerobic Plate Count
AMSA	American Meat Science Association
AR	Argon
ADBD	Atmospheric dielectric barrier discharge
APP	Atmospheric pressure plasma
BP	Baird Parker Media
CAP	Cold atmospheric plasma
CP	Cold plasma
CFU	Colony forming unit
CIE	Commission Internationale de l'Eclairage
DBD	Dielectric barrier discharge
DBD-HVCAP	Dielectric barrier discharge high-voltage cold atmospheric plasma
E. coli	*Escherichia coli*
EFSA	European Food Safety Authority
O3	Ozon
GRAS	Generally recognized as safe
He	Helium
pH	Hydrogen ions concentrations
IR	Infrared
CIE	International Commission on Illumination
KV	Kilo Voltage
LSD	Least square difference test
L*	Lightness
MDA	Malonaldehyde
NO2	Nitric dioxide
NO	Nitric oxide
NTP	Non-thermal plasma
ANOVA	One-Way Analysis of Variance
Oxy	Oxygen
ONOO-	Peroxynitrite anion
PFB	Plasma functionalized buffer
PFL	Plasma functionalized liquids
PFW	Plasma functionalized water
PCA	Plate Count Agar

RNS	Reactive nitrogen species
RONS	Reactive oxygen and nitrogen species
ROS	Reactive oxygen species
a*	Redness
RH	Relative Humidity
RSM	Response surface methodology
SEM	Scanning electron microscope
S. aureus	*Staphylococcus aureus*
SPSS	Statistical Package for the Social Sciences
TBA	Thiobarbituric acid
TVBN	Total volatile basic nitrogen
UV	Ultraviolet
VRBG	Violet Red Bile Glucose Agar Media
b*	Yellowness