

GRUPPI QUESITI NON ESTRATTI PROVA ORALE DEL 10.01.2023
GRUPPO QUESITI 1

1. ILLUSTRARE BREVEMENTE LE PROCEDURE DI CAMPIONAMENTO DI UNA MATRICE LIQUIDA IN STERILITÀ
2. IN TABELLA SONO RIPORTATI I VALORI DEL PARAMETRO SPESSORE DI UN CAMPIONE DI FILM. PER OGNI CAMPIONE IL PARAMETRO È STATO MISURATO IN TRIPPLICATO. ESEGUIRE UN'ANALISI DEI DATI (ANALISI VARIANZA AD UN FATTORE) PER VERIFICARE SE LE REPLICHE EFFETTUATE PER OGNI CAMPIONE SONO RIPRODUCIBILI. SE L'IPOTESI È CONFERMATA, CALCOLARE IL VALORE MEDIO E LA DEVIAZIONE STANDARD DEL VALORE:

Repliche	Spessore (mm)
1	0,056
1	0,058
1	0,073
2	0,07
2	0,073
2	0,062
3	0,053
3	0,063
3	0,062

QUESITO IN LINGUA INGLESE DA LEGGERE E TRADURRE

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ORIGINAL PAPER

Multi-functional coating of cellulose nanocrystals for flexible packaging applications

Fei Li · Paolo Biagioni · Monica Bollani ·
Andrea Maccagnan · Luciano Piergiovanni

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Abstract In this paper, we systematically address the performance of cellulose nanocrystals (CNs) coated flexible food packaging films. Firstly, the morphology of CNs from cotton linters and homogeneity of its coating on different substrates were characterized by transmission electronic microscopy and atomic force microscopy. Then, the 1.5 μm thick CNs coating on polyethylene terephthalate (PET), oriented polypropylene, oriented polyamide (OPA), and cellophane films were characterized for their mechanical, optical, anti-fog, and barrier properties. CNs coating reduces the coefficient of friction while maintaining high transparency ($\sim 90\%$) and low haze (3–4 %) values, and shows excellent anti-fog properties and remarkable oxygen barrier (oxygen permeability coefficient of CNs coating, $P^*\text{O}_2$,

$0.003 \text{ cm}^3 \mu\text{m}^{-2} 24 \text{ h}^{-1} \text{ kPa}^{-1}$). In addition, the Gelbo flex test combined with oxygen permeance (PO_2) measurements and optical microscopy are firstly reported for evaluating the durability of coatings, revealing that the CNs coated PET and OPA provide the best performance among the investigated coated films. CNs are therefore considered to be a promising multi-functional coating for flexible food packaging.

Keywords Cellulose nanocrystals (CNs) · Food packaging · Oxygen barrier · Anti-fog properties · Bio-coating

Introduction

Nowadays, the vast majority of food packaging materials are constituted of petrol-based plastics, increasing the dependency of the global economy on fossil resources. Therefore, considering also environmental problems, the interest in bio-based materials, such as poly lactic acid (PLA; Vert et al. 1995; Drumright et al. 2000; Auras et al. 2004; Lim et al. 2008), starch (Tharanathan 2003; Avella et al. 2005), gluten (Guillaume et al. 2010; Montañó-Leyva et al. 2013), or other bio-polymers (Cha and Chinnan 2004; No et al. 2007; Rhim and Ng 2007; Hansen and Plackett 2008; Muzzarelli et al. 2012) has recently been hugely rising. However, such materials are not yet widely applicable because of their inferior properties (Ray et al. 2002, 2003; Krikorian and Pochan

F. Li (✉) · L. Piergiovanni
Packaging Division, Department of Food, Environmental and Nutritional Sciences (DeFENS), Università degli Studi di Milano, Via Celoria, 2, 20133 Milan, Italy
e-mail: feili@ummi.it

P. Biagioni
Dipartimento di Fisica and CNISM, Politecnico di Milano, Piazza Leonardo da Vinci, 32, 20133 Milan, Italy

M. Bollani
IFN-CNR, L-NESS, Via Anzani 42, 22100 Como, Italy

A. Maccagnan
Packaging Division, GOGLIO S.p.A.,
Via dell'Industria 7, 21020 Daverio, VA, Italy

GRUPPO QUESITI 3

1. ILLUSTRARE I PRINCIPI GENERALI DELL'ACCREDITAMENTO DI METODOLOGIE ANALITICHE
2. LA MATRICE DEI DATI RIPOSTA COME INCREMENTA IL PESO DI UN CAMPIONE IN FUNZIONE DEL TEMPO QUANDO CONDIZIONATO A DIVERSE ATTIVITÀ DELL'ACQUA. RAPPRESENTA L'INCREMENTO DI PESO DEI CAMPIONI IN FUNZIONE DEL TEMPO UTILIZZANDO UN GRAFICO A DISPERSIONE E RIPOSTA IL VALORE DELL'INCREMENTO DI PESO ALL'EQUILIBRIO IN FUNZIONE DELL'ATTIVITÀ DELL'ACQUA:

Tempo (min)	peso (g)	aw
0	1	0,4
0,2417	1,000113644	0,4
0,475	1,000302517	0,4
0,7084	1,000457978	0,4
0,9417	1,000561017	0,4
1,1748	1,000655854	0,4
1,4081	1,000716078	0,4
1,6415	1,0007747	0,4
1,8748	1,000831322	0,4
2,1084	1,000860734	0,4
2,3416	1,000881142	0,4
2,575	1,000921357	0,4
2,8167	1,00095357	0,4
3,0584	1,000978379	0,4
3,2916	1,000997787	0,4
3,525	1,001016594	0,4

QUESITO IN LINGUA INGLESE DA LEGGERE E TRADURRE

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ORIGINAL CONTRIBUTION

The effect of tomato juice supplementation on biomarkers and gene expression related to lipid metabolism in rats with induced hepatic steatosis

Gala Martín-Pozuelo · Inmaculada Navarro-González · Rocío González-Barrio · Marina Santaella · Javier García-Alonso · Nieves Hidalgo · Carlos Gómez-Gallego · Gaspar Ros · María Jesús Periago

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Abstract

Purpose Tomato products are a dietary source of natural antioxidants, especially lycopene, which accumulates in the liver, where it exerts biological effects. Taking into consideration this fact, the aim of the present study was to ascertain the effect of tomato consumption on biomarkers and gene expression related to lipid metabolism in rats with induced steatosis.

Methods Adult male Sprague–Dawley rats (8 weeks old) were randomly grouped ($n = 6$ rats/group) in four experimental groups: NA (normal diet and water), NL (normal diet and tomato juice), HA (high fat diet and water) and HL (high fat diet and tomato juice). After 7 weeks, rats were euthanized, and plasma, urine, feces and liver were sampled to analyze the biomarkers related to lipid metabolism, inflammation and oxidative stress.

Results The H diet induced steatosis (grade II) in the HA and HL groups, which was confirmed by the levels of alanine aminotransferase and aspartate aminotransferase, histological examination and the presence of dyslipidemia. The intake of tomato juice led to an accumulation of *all-E* and *Z*-lycopene and its metabolites in the livers of these animals; levels were higher in HL than in NL, apparently due to higher absorption (63.07 vs. 44.45 %). A significant improvement in the plasma level of high-density lipoprotein was observed in the HL group compared with HA animals, as was an alleviation of oxidative stress through

reduction of isoprostanes in the urine. In relation to fatty acid gene expression, an overexpression of several genes related to fatty acid transport, lipid hydrolysis and mitochondrial and peroxisomal β -fatty acid oxidation was observed in the HL group.

Conclusions The consumption of tomato juice and tomato products reduced hallmarks of steatosis, plasmatic triglycerides and very low-density lipoproteins, and increased lipid metabolism by inducing an overexpression of genes involved in more efficient fatty acid oxidation.

Keywords Lycopene · NAFLD · Inflammatory biomarkers · Oxidative biomarkers · Fatty acid · Gene expression

Introduction

Nonalcoholic fatty liver disease (NAFLD) is considered the major liver disorder in developed countries, and it is recognized as the hepatic manifestation of metabolic syndrome, one of a broader constellation of metabolic abnormalities including obesity, diabetes, dyslipidemia and insulin resistance. NAFLD covers a spectrum of signs of hepatic damage ranging from simple steatosis in its most benign form to an intermediate lesion, termed nonalcoholic steatohepatitis (NASH), and sometimes cirrhosis [1].

The hallmark of NAFLD is accumulation of triglycerides (TG) by hepatocytes, which mainly occurs due to an imbalance between the intrahepatic production of TG and the removal of intrahepatic TG, exported within very low-density lipoproteins (VLDL) [1]. In this phase, the ability of insulin to inhibit hepatic glucose production is reduced, and this hepatic insulin resistance is characterized by hyperinsulinemia, hyperglycemia and an increase in VLDL

G. Martín-Pozuelo (✉) · I. Navarro-González · R. González-Barrio · M. Santaella · J. García-Alonso · N. Hidalgo · C. Gómez-Gallego · G. Ros · M. J. Periago
Department of Food Technology, Food Science and Nutrition, Faculty of Veterinary Sciences, Regional Campus of International Excellence "Campus Mare Nostrum", University of Murcia, Espinardo, 30071 Murcia, Spain
e-mail: galamartin@un.es