

# Antioxidant and antimicrobial properties of PLA-based active packaging with pomegranate peels and extract

**Mariana A. Andrade<sup>1,2,3,\*</sup>, Pedro V. Rodrigues<sup>4</sup>, Carolina Barros<sup>4</sup>, Vasco Cruz<sup>4</sup>, Ana Vera Machado<sup>4</sup>, Cássia H. Barbosa<sup>1,5</sup>, Anabela Coelho<sup>1</sup>, Rosália Furtado<sup>1</sup>, Cristina Belo Correia<sup>1</sup>, Margarida Saraiva<sup>6</sup>, Fernanda Vilarinho<sup>1</sup>, Fernando Ramos<sup>2,3</sup>, Ana Sanches Silva<sup>2,7,8,9</sup>**

<sup>1</sup> Department of Food and Nutrition, National Institute of Health Doutor Ricardo Jorge, Av. Padre Cruz, 1649-016 Lisbon, Portugal

<sup>2</sup> University of Coimbra, Faculty of Pharmacy, Coimbra, Azinhaga de Santa Comba, 3000-548 Coimbra, Portugal

<sup>3</sup> REQUIMTE/LAQV, R. D. Manuel II, Apartado, 55142 Oporto, Portugal

<sup>4</sup> Department of Polymer Engineering, Institute for Polymers and Composites (IPC), Campus de Azurém, University of Minho, 4804-533 Guimarães, Portugal

<sup>5</sup> METRICS, Department of Chemistry, NOVA School of Science and Technology, NOVA University of Lisbon, Caparica Campus, 2829-516 Caparica, Portugal

<sup>6</sup> Department of Food and Nutrition, National Institute of Health Doutor Ricardo Jorge, Rua Alexandre Herculano 321, 4000-055 Oporto, Portugal

<sup>7</sup> National Institute for Agricultural and Veterinary Research (INIAV), I.P., Rua dos Lagidos, Lugar da Madalena, Vairão, 4485-655 Vila do Conde, Portugal

<sup>8</sup> Center for Animal Science Studies (CECA), ICETA, University of Oporto, 4501-401 Oporto, Portugal

<sup>9</sup> Associate Laboratory for Animal and Veterinary Sciences (AL4AnimalS), 1300-477 Lisbon, Portugal

[\\*mariana.andrade@insa.min-saude.pt](mailto:mariana.andrade@insa.min-saude.pt)

Active food packaging' primary goal is to extend foodstuffs' shelf life, through a dynamic and continuous interaction between the package and the packaged food. In an emission active packaging, the objective is the gradual release of antioxidant and/or antimicrobial compounds into the food surface, to delay the natural foods' degradation. The active compounds can be extracted from several sources, such as aromatic plants, seaweeds, fruits by-products, among others. Since 50% of pomegranate is composed by peels, and since it is mainly consumed in juice and jam form, pomegranate peels may represent a considerable asset for the extraction of such compounds.

The principal objective of this work was to evaluate the antioxidant and antimicrobial properties of polylactic-based active packaging incorporated with 3% (w/w) of pomegranate peels (PLA/3PP) and 3% (w/w) of pomegranate peels extract (PLA/3PPE). For the *in vitro* antioxidant activity evaluation, 9.08 cm<sup>2</sup> of films were immersed in the food simulator, ethanol 95% (v/v), at 40 °C for 10 days. Then, the DPPH radical scavenging assay[1] was performed, as well as the total content of phenolic compounds[2], total content in flavonoids[3], content in punicalagin (A+B) and ellagic acid were determined[4]. Also, to fully determine the total content in punicalagin (A+B) and ellagic acid, the films were kept in methanol at 25 and 40 °C for 24 h. The antimicrobial activity of the films was evaluated with *Listeria monocytogenes*, *Staphylococcus aureus*, *Enterococcus faecalis*, and *Escherichia coli*, in accordance with ISO 22196:2011[5].

Results showed that PLA/3PPE presented a higher antioxidant potential and higher content in phenolic compounds and flavonoids. Only ellagic acid was detected in the active PLA-based films. Regarding the antimicrobial activity, both films presented antimicrobial activity against *S. aureus*.

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